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REVISION OF THE NEARCTIC MYRMELEONIDAE.

BY NATHAN BANKS.

WITH FOUR PLATES.

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NO. 1.— *Revision of the Nearctic Myrmeleonidae.*

BY NATHAN BANKS.

THE Myrmeleonidæ or ant-lion flies are generally recognized among the Neuroptera by their slender, rather densely veined wings, the long body, and short, clavate antennæ. The habits of the larvæ of certain forms (particularly Myrmeleon) in digging pits to entrap wandering insects has given them their common and scientific names.

The Nearctic Myrmeleonidæ are chiefly a northward extension of the Neotropical fauna, thus Texas, New Mexico, and Arizona are the most favored states. Several of the genera as *Brachynemurus*, *Hesperoleon*, *Austroleon*, *Glenurus*, and *Psammoleon* are common in Central and South America, but do not occur in the Old World. The genus *Myrmeleon* occurs in all the continents, and is everywhere fairly common. *Dendroleon* does not occur south of the United States, but is represented in Europe and Asia, in the latter country with numerous species. It is more common in the eastern than the western states. *Hesperoleon* has but one or two species in the eastern states, but many in the western states.

The family, originally of but one genus, has undergone many changes, until now there are four subfamilies and nearly a dozen tribes. One of the subfamilies, the *Palparinae*, does not occur in America, and several tribes do not occur in the United States. The forking of the third anal vein I do not consider of tribal value; although usually quite constant there are species it would separate that are otherwise closely related, and in some species there are specimens with this vein forked in one wing and simple in the opposite wing. The absence of the small cross-veins in the apical field is also too inconstant to be even of generic value; specimens in which these are absent in only one wing are not unusual, and a fair series of any species will show variation in their number. Likewise the absence of spurs is not of tribal importance. The various genera lacking spurs show by their venation affinity to various tribes.

The origin of the radial sector in relation to the cubital fork I still consider of great importance, but for the Nearctic forms it is best used in connection with the course of the basal part of the second anal vein as indicated in the following tables. The character I used as of prime importance for African Myrmeleons, whether there is one (or two) cross-veins before the radial sector in the hind-wing or four (or more), cannot be used on American Myrmeleons, for in the group of *Brachy-*

nemurus, which usually has two or three such veins, there is sometimes only one and sometimes four or even five. It is necessary therefore to have recourse to the characters of the second anal vein. Once outside of the subfamily Dendroleoninae the number of cross-veins before the radial sector is as useful in American Myrmeleons as in those of the Old World.

The characters used in the classification of genera are mostly taken from the venation and legs. The palpi, antennae, pronotum, and abdomen are used to a less extent. The species are largely based on coloration, color and length of hair, length of spurs, minor venational points, and the male appendages. Most of the characters used are readily understood, being similar to those in other insects. There is in many species the appearance of a line through the middle of the wing toward the tip. This is produced by the bending of the branches of the radial sector; it has been termed (by Tillyard and Petersen) the Banksian or anterior Banksian line. A similar line in the cubital area is called the posterior Banksian line or intercubital line. In many of the Nearctic species these lines are hardly as useful as in Old World species. The small cross-veins in the apical field have been called gradate veins; they are of little value. Toward the outer part of the wing the median and cubital veins are connected rather more than in the rest of their courses, this is the rhagma, and there is frequently a dark spot on it, or a line up from it.

One Nearctic species was described by DeGeer, one by Drury, a few by Burmeister, Rambur, and Thomas Say. Hagen in 1861 in his Synopsis of North American Neuroptera, gave the first good account, describing twenty-five species, and later he added ten more. In recent years Mr. R. P. Currie and the writer have described several new species, while Navas has added four names, and McClendon one. One new genus, two new species, and a new variety are included in this account, a total of sixty-nine species, two varieties, and nineteen genera.

Doubtless a few more will be found in the West and in southern Texas. There are several species known from but one specimen. The genera, I think, have been divided enough, possibly it would be better to sink under *Brachynemurus* several of the related genera. Two of the species (*delicatulus* and *barberi*) I have not seen for some years and the original descriptions are given, supplemented by notes and drawings made ten years ago, together with some notes kindly furnished by Mr. S. A. Rohwer.

Navas has published two genera and four species as new from the United States. Neleon is a new genus for *Myrmeleon immaculatus*

DeGeer. This species is very close to the type of the genus in so many structural characters that if the genus is to be divided it surely will go with the genotype. The number of gradiform veinlets in the apical field is variable in this as well as in most, if not all, species of the family; the development of the plicate lines shows a gradation in the various species so that limitation is not possible. *Mastega* is a new genus; and *M. texanus*, a new species, is evidently a Cryptoleon. It is true that in *C. nebulosum* (the genotype) there are nearly always numerous costal cross-veins connected, but the number is variable; but in *C. signatum* there are usually only very few costals connected, and frequently none. With any sort of a series this character is too variable for generic importance here; in some genera the character is much more constant. As to the species *texanus*, it agrees generally with *C. signatum*, but is said to have the abdomen "fusco pilosum." This would ally it to *C. nebulosum*. I have seen no specimen of either species from Texas, and it is possible that *texanus* is a good species. The type is in the Vienna Museum.

Hesperoleon placidus is from New Jersey. This is a dark, strongly-marked specimen of *H. abdominalis* in which the pronotal stripes are extended forward. I have several such specimens from the east, and they grade into the normal form.

Hesperoleon nivatensis is from Nevada. By the infuscated mid- and hind-femora and the long male appendages this is *H. singularis* Currie. The amount of infuscation in the femora is variable, but they are not dotted.

Psammoleon serpentinus agrees with *P. sinuatus* Currie, but this serpentine line is not constant in this species nor peculiar to it.

Synopsis of the subfamilies.

1. In the fore-wings the second anal vein runs in a fairly even curve (Plate 2, fig. 41), and is connected to the third anal by a short cross-vein, or united to it for a short distance (Plate 2, fig. 40); the radial sector usually arises before the cubital fork; in hind-wings rarely four veins before the origin of the radial sector *Dendroleoninae*.
In the fore-wings the second anal vein runs up to and close beside the first anal (Plate 2, fig. 39, 45), then at an angle turns down and unites with the third anal for a distance; abdomen shorter than wings.....2
2. In the hind-wings but one (or rarely two) cross-veins before origin of the radial sector, latter point before the cubital fork..... *Macronemurinae*.
In the hind-wings four (or more) cross-veins before radial sector, latter usually beyond fork of cubitus; antennae well separated at base.

Myrmeleoninae.

DENDROLEONINAE.

Of Nearctic forms this is the most primitive group, the venational characters being far less constant than in the two other subfamilies. The group is principally American, only a few forms are known in Europe and Asia, and possibly in South Africa, while several striking forms of the typical tribe occur in Australia.

There are two tribes separable as follows: —

1. In the fore-wings the cubital vein shows at base a distinct fork running out a short distance and then uniting with first anal (Plate 2, fig. 41); legs very slender, basal tarsal joint equal next two *Dendroleonini*.
In the fore-wings the cubital vein has no distinct fork at base, sometimes a faint trace; legs much less slender, basal tarsal joint rarely equal to next two joints united. *Brachynemurini*.

DENDROLEONINI.

The Dendroleonini has but one, the typical, Nearctic genus.

DENDROLEON Brauer.

Reise freg. Novara. Zool. theil., 1866, 2. Neur., p. 42.

Antennae rather long; pronotum longer than broad; legs very slender, femora cylindrical, tibia about as long as femur, basitarsus as long as fifth joint, spurs very long, but little curved, equal to more than two joints. Wings moderately broad, with large spots, a single costal series, in both wings the radial sector arises before the cubital fork, in hind-wing one cross-vein before radial sector, the first anal in hind-wing runs parallel to the hind-margin and into cubital fork, in fore-wing the second anal runs free of both first and third anals and connected to each by one or more cross-veins, basal fork of cubitus distinct. Banksian line fairly complete in both wings, no intercubital line; abdomen not as long as hind-wings. In the type and in Nearctic species in the hind-wing the third anal is separate from second, forked near tip, and there is a fourth anal closely parallel to hind-margin; in the exotic species the third is united to second at base, and the fourth is absent.

TYPE.— *D. pantherinum* (Fabricius). Europe.

DENDROLEON OBSOLETUM Say.

Plate 4, fig. 101.

Formicaleo obsoletus Say, Journ. Acad. nat. sci. Phil., 1839, 8, p. 44; Ed. Lec., 2, p. 413.

Dull yellowish gray or sordid. Interantennal mark brown, not much below nor above antennae vertex hardly darkened, sometimes a yellowish band below. Pronotum usually unmarked, sometimes median or lateral short, faint lines; rest of notum black in middle, pale on sides; pleura dark below, pale above; front- and mid-legs largely black, hind-femora black, pale at base, and a band before tip, tibia pale, a black line below, and base and tip dark; tarsi partly pale, spines slender, black, the front-tibiae are sometimes pale beneath near tip; abdomen black, sometimes showing pale spots in middle of some segments, hairs black, some white intermixed, not very long. Veins white and brown interrupted, often in streaks, spot at base of stigma, one behind, and one beyond, a long mark at rhagma, often broken into several long spots, an irregular mark at end of anal, often broken, and one beyond, and one before on the hind-margin, one at origin of radial sector, and two or three smaller spots beyond, usually several small spots along cubitus; hind-wings with mostly pale venation, some dark streaks, a large spot, larger than any in the fore-wing, over the last cross-veinlet from radial sector to radius before stigma, another more irregular near tip, and three or four small spots behind these, two of which are on the hind-margin.

In the fore-wings many of the costals are forked, about four cross-veins before radial sector, about eleven branches of radial sector, apical field with a few cross-veins, anal vein with about ten branches; in hind-wings one cross-vein before radial sector, radial sector about ten branched, anal vein with eight branches.

Length fore-wing 25 to 31 mm., width 7 to 8.8 mm.

Length hind-wing 25 to 31 mm., width 5 to 7 mm.

Length abdomen ♀ and ♂ 15 to 17 mm.

Specimens examined.—N. H.: Durham. Mass.: Sherborn; July; Tyngsboro. Conn.: New Milford. N. Y.: Ithaca, August. Md.: Travilah, July. Va.: Falls Church, July. N. C. (Morrison). Ill.: Galena. Mich.: Huron Co. Also Raleigh, N. C. (N. C. state coll.). Yaphank, N. Y. (Davis coll.). Florida (Slosson coll.).

DENDROLEON SPECIOSUM Banks.

Plate 2, fig. 41.

Trans. Amer. ent. soc., 1906, 32, p. 7.

This species may be compared to *D. obsoletum*. The interantennal mark is rather more prominent, the vertex darker, and with a white band in front; the median and lateral lines on pronotum are distinct; the front-part of the mesonotum is mostly pale in the middle; front- and mid-tibia mostly pale, and front-femora often pale below, the mid-femora with broad pale preapical band, hind-legs more pale, usually no line under tibia.

The spots on the wings are smaller and more numerous, beyond the much broken streak from the rhagma there are many spots on the fork which tend to make a row; the spot on hind-margin beyond the long curved mark at end of anal is also elongate (much longer than in *obsoletum*) and points to the tip of the anal mark. There is more dark in the venation, and many veinlets are more or less bordered. In the hind-wings the spots are also smaller and more numerous, and the venation largely dark (in *D. obsoletum* mostly pale), and many small clouds on forks toward margin.

In the fore-wing the costal area is more narrow, and the costals a little less numerous, so that these cells are not nearly as narrow as in *D. obsoletum*. The species is a little smaller than *obsoletum*.

Length fore-wing 22 to 29 mm., width 5.5 to 8 mm.

Length hind-wing 22 to 29 mm., width 4 to 6.5 mm.

Length abdomen ♀ and ♂ 12 to 15 mm.

Specimens examined.— Colo.: Boulder, July. (TYPE). N. M.: Jemez Mts., July. Ariz.: Palmerlee. Calif.: Modoc Co., July.

BRACHYNEMURINI.

1. In the hind-wing the first anal runs parallel to the cubital fork for some distance, and connected thereto by several cross-veins; Banksian lines usually evident. 2
- In the hind-wing the first anal bends down to margin near the forking of the cubitus, not running parallel to the cubital fork, and not connected thereto but once or twice; Banksian lines hardly distinct. 7
2. No spurs. *Cryptoleon*.
- Spurs present. 3
3. Costal area of fore-wing with two or three series of cells for about half-way or more. 4
- Costal area of fore-wing with but one series of cells, except sometimes near the stigma. 5

4. Cross-veins before radial sector in the fore-wing mostly connected; in our species three series of costal cells.....*Calinemurus*.
Few if any cross-veins before radial sector connected; two series of costal cells; front-coxae with macrochaetae.....*Brachynemurus*.
5. Labial palpi elongated, very much longer than the front-tarsi; spurs equal two tarsal joints; antennae rather widely separated.....*Scotoleon*.
Labial palpi not longer than front-tarsi.....6
6. Front-femur with a row of curved white bristles above as well as several on the front-coxa.....*Netroneurus*.
Front-femur without such bristles, sometimes one or two on the front-coxa.
Hesperoleon.
7. No spurs, basal tarsal joint longer than the fifth.....*Maracandula*.
Spurs present.....8
8. Front-coxa with several curved white bristles as well as a row on front-femur above, second and third anal veins of front-wings usually united at a point.....9
Front-coxa and front-femur without the comb of white macrochaetae; in fore-wing the cubitus often has its first cross-vein oblique as though it was a cubital fork.....*Clathroneuria*.
9. Legs very slender, front-tibia equal to front-femur; mesonotum with enlarged bristles above; abdomen shorter than hind-wings; antennae elongate; second and third anals in fore-wing forked.....*Chaetoleon*.
Legs not especially slender, front-tibia a little shorter than front-femur; mesonotum with only simple bristles above; abdomen about equal to or longer than hind-wings; antennae very short.....*Austroleon*.

CRYPTOLEON Banks.

Can. ent., 1901, **33**, p. 330.

Last joint of labial palpi not distinctly swollen; antennae rather short, not strongly clavate; the pronotum rather broader than long in the middle; basal tarsal joint nearly as long as the next two united, no spurs; abdomen of male much longer than in female. Costal area of wings either one- or two-celled, showing much variation, Banksian line in fore-wing either faint or distinct, intercubital not definite; radial sector much before cubital fork, second anal running in even curve, connected to the third by a cross-vein, second usually simple, third forked. In hind-wings the radial sector usually before cubital fork, two cross-veins before it; first anal runs out parallel to the cubital fork for some distance and connected thereto by several cross-veins, second and third anals usually both forked.

TYPE.—*C. nebulosum* (*conspersus* (Rambur) (Olivier)).

The three Nearctic species are distinguished in the following table:

1. Front-wings with costal area largely biareolate, usually partly in hind-wings; pronotum with median pale mark only in front; wings heavily marked, usually some dark between subcosta and radius; hair on abdomen mostly black.....*nebulosum*.
Front-wings with costal area mostly uniareolate; hind-wings always so; pronotum with a pale median stripe throughout; wings very lightly marked, no dark between subcosta and radius; hair on abdomen mostly white.....2
2. Front-femora dark on outer sides; wings very slender, median vein largely white; western.....*henshawi*.
Front-femora mostly pale, dotted with dark; wings broader, median vein largely dark; eastern.....*signatum*.

CRYPTOLEON NEBULOSUM (Olivier).

Plate 3, fig. 49, 56.

Myrmeleon nebulosum Olivier, Encycl. meth., 1811, 8, p. 127.

Interantennal mark somewhat above and below antennae, often including a pale median dot between antennae; vertex dark brown or black; palpi marked with brown; pronotum dark, three pale spots in front-part, the median one linear and behind on each side is a pale streak; rest of notum mostly black, a few pale spots, scutelli pale each side behind; pleura also dark; legs pale, femora and tibiae heavily dotted, latter with dark tips, tips of tarsal joints black, bristles on legs mostly black, but front- and mid-femora with some white bristles; hair on pleura white; abdomen black, middle and tip of some segments pale, much more so in the male, hair long black, but some at base white. Wings heavily marked, the veins and cross-veins mostly dark and often bordered with dark; dark streaks between the subcosta and radius, large spot at base of stigma, several above the cubitus, one at rhagma extending obliquely outward, and one at end of the anal vein; many smaller spots, and the marginal forkings dark. Hind-wings much less marked, but the venation is largely dark, the marginal forkings, outer gradates, rhagma, and several radial cross-veins more or less margined with dark. Fore-wings with costal area almost wholly biareolate, three or four cross-veins before the radial sector, outer two or three often connected, ten or eleven branches of radial sector, several cubitals connected, Banksian line fairly distinct. In hind-wings the costal area often partly biareolate, but sometimes only a few are even forked. Venation of both pairs with very long hairs. Male abdomen much longer and more slender than in the female, the

last segment about twice as long as high, appendages fully one half of the last segment.

Length fore-wing 22 to 27 mm., width 6.5 to 7.8 mm.

Length hind-wing 21 to 25 mm., width 5 to 6.8 mm.

Length abdomen ♀ 18 to 20 mm., ♂ 25 to 27 mm.

Specimens examined.—N. C.: Southern Pines, May. N. J.: Lahaway, July. Ga.: Millen, July; Savannah. Fla.: Auburndale. Ohio: Columbus. Mich.: Ludington; Port Huron, Berrien Co., July; Huron Co., July. Ontario: Hamilton, Giants Tomb, July. Also Upper Wisconsin River, Lakehurst, N. J. (Davis coll.). St. Simon's Island, Ga. (Cornell univ.).

CRYPTOLEON SIGNATUM (Hagen).

Plate 3, fig. 50.

Maracanda signata Hagen, Can. ent., 1887, 19, p. 215.

Interantennal mark usually broken, showing spots below antennae and a band above, vertex dark in middle, sometimes with a pale median line; palpi mostly pale, last joint of labial palpi with an outer scar; pronotum with two broad dark stripes near middle, each containing a pale spot in front; rest of notum dark, much streaked with pale, the scutelli largely pale; pleura dark, much marked with pale, the hair white; legs pale, femora and tibiae rather finely dotted with dark, tarsi dark on tips of the joints, femoral bristles partly white; abdomen black, in male much marked with pale above, hair almost wholly white, in male some on the basal segments above dark. Wings only lightly marked, although venation is mostly dark, only a few cross-veins or forks slightly margined with dark, sometimes a small spot at base of stigma, at rhexma, and at end of anal, no dark between subcosta and radius. Hind-wings less marked, usually dark dot at rhexma and stigma, the venation mostly dark. Fore-wings with the costal series normally wholly uniareolate, but in various specimens a few cells near middle may be crossed, usually three cross-veins before radial sector, sometimes two are connected, eight to ten branches of the radial sector, often a few cubitals connected, but sometimes all free, often a few cross-veins in the anal area, hairs on venation less numerous and shorter than in *C. nebulosum*. Abdomen of male elongate and slender, last segment not twice as long as high, appendages more than one half of last segment.

Length fore-wing 20 to 23 mm., width 5.2 to 6 mm.

Length hind-wing 19 to 22 mm., width 4 to 5 mm.

Length abdomen ♀ 15 to 16 mm., ♂ 20 to 22 mm.

Specimens examined.—White Fish Point, Lake Superior (TYPE). Mich.: Ludington, Berrien Co., July; Huron Co., July. Ohio: Sandusky; Columbus. Ill.: Havana. N. Y.: Rockaway Beach, Staten Island, August. R. I.: Weekapaug, July. Also Illinois (Amer. mus. nat. hist.).

CRYPTOLEON HENSHAWI Hagen.

Plate 2, fig. 29. Plate 3, fig. 55.

Maracanda henshawi Hagen, Can. ent., 1887, 19, p. 216.

The species agrees very closely with *signatum*; the dark of the vertex is broken up by several pale spots, the pronotal marks are the same, the rest of thorax and pleura also about the same, the legs are pale and dotted, but the front-femora are wholly brown on the outer sides; the abdomen (male only known) is streaked with pale above as in *signatum*, the hair is mostly white, with some dark above toward base. The wings are plainly more slender than in *signatum*, the fore-wings more heavily marked, spots on several of the radial cross-veins, in front of cubitus, as well as at stigma, at end of anal and a distinct oblique line from rhexma over gradates to near the tip, the venation is mostly dark, but the median vein in both pairs is mostly pale. In the hind-wings the markings are less distinct, but more than in *signatum*. Structurally it is similar to *signatum*, the costal area wholly one-celled, and in fact only a few veins near stigma forked, there are eight branches to radial sector, in the apical field very few cross-veins.

Length fore-wing 19 mm., width 4.6 mm.

Length hind-wing 17 mm., width 3.7 mm.

Length abdomen ♂ 23 mm.

Specimen examined.—Ore.: Umatilla, June (TYPE).

HESPEROLEON Banks.

Ent. news, 1913, 24, p. 64.

Antennae usually less than the diameter of the basal joints apart; labial palpi not longer than front-tarsi. Legs moderately short, basal tarsal joint rarely equal to next two united, always much shorter than apical joint; spurs variable in length, less than one to more than two joints long. Abdomen of male longer than in female and much longer than the wings. Fore-wings with one series of costal cells, except

sometimes toward the stigma, Banksian and intercubital lines usually fairly distinct, radial sector arises before cubital fork, first anal runs parallel to cubital fork for some distance, and connected thereto by less than nine cross-veins, second anal usually not forked, third usually forked.

Hind-wings with two to four cross-veins before radial sector (rarely with but one), second anal usually forked; first anal runs parallel to the cubital fork for some distance; Banksian line usually fairly definite, but intercubital indistinct or absent; the radial sector little, if any, before forking of cubitus.

TYPE.—*H. ferox*, Walker.

In the species assigned to this genus there is quite a wide variation; certain forms have the hind-margin of hind-wings near base concave, but in *abdominalis* it is hardly so, connecting the two series. In several, as *maculosus*, *tenuis*, *coquillettei*, and *abdominalis*, the spurs are equal to two tarsal joints, but some *abdominalis* hardly so, while in *blandus* they are fully one and one half joints, and in others grade down to less than one joint. These forms with the long spurs have the median vein unmarked, and all, except *maculosus*, has the hind-margin of hind-wing concave. In *maculosus*, and also in *yavapai* there is but one cross-vein before the radial sector in hind-wing, however these two forms are so different in spurs and other structures they should not be united against the other species. *H. irregularis* is the most distinct structurally, besides the irregular venation, the hind-wing is very narrow at base, the second anal not forked, and the antennae closer together than in other species; however in *maculosus* the second anal is also simple, and there is variation in space between antennae. The groups may be tabulated as follows:—

1. But one cross-vein before radial sector in hind-wing. *maculosus*, *yavapai*.
2. Hind-wing with second anal not forked; antennae very close together.
irregularis.
3. Spurs equal to two tarsal joints. *abdominalis*, *coquilletti*, *tenuis*.
4. Hind-margin of hind-wings toward base concave. *blandus*, *papago*.
5. Costal cross-veins spotted at each end; often a double costal series near stigma. *versutus*, *mexicanus*.
6. Abdomen banded with pale. *sackeni*.
7. All the other species.

In *H. coquilletti*, *maculosus*, and *yavapai* there is but one cross-vein between the second and third anal in the fore-wings, in the other species there are normally two such cross-veins, but in *H. papago*, about half the specimens have one, and half two.

The Nearctic species, twenty-five in number, are tabulated below. Some of the characters used may prove to be more variable with more material.

1. Abdomen banded with large pale spots. 2
Abdomen hardly if at all banded, marks, when present, lineate. 3
2. Second and third segments pale at tip as well as in middle; second and third anals of fore-wing connected twice. *sackeni*.
Second and third segments broadly pale in middle only; second and third anals of fore-wings connected but once. *yavapai*.
3. Labrum black; pronotum yellow, with narrow median stripes, and short side stripes; femora not dotted. *nigrilabris*.
Labrum pale. 4
4. Pronotum with broad, solid, median brown (or pink-brown) stripe; wings heavily dotted; hind-margin of hind-wings near base concave. *irregularis*.
Pronotum with median stripe divided by pale line at least in front, and more or less distinct lateral stripes. 5
5. Median vein pale (rarely marked); both scutelli with median dark line or spot; hind-spurs equal to two joints. 6
Median vein marked with dark and pale; at least mesoscutellum with two or more spots or streaks, else spurs not equal to two joints. 9
6. Median stripes of pronotum distinct, united behind, divergent in front. 7
Median stripes not visible behind furrow, only more or less distinct in front. 8
7. Wings practically without spots; hind-margin of hind-wings near base concave. *coquilletti*.
Wings heavily spotted; hind-margin of hind-wings near base convex. *maculosus*.
8. Fore-wings with the spots arranged largely in two longitudinal areas, with space between largely unmarked. *tenuis*.
Fore-wings with dots scattered fairly evenly over whole wing. *abdominalis*.
9. Hind-margin of hind-wing near base concave; femora dotted; costal cross-veins without large spot at outer ends; hair of abdomen long. 10
Hind-margin of hind-wing near base, straight or convex, not plainly concave. 11
10. Median pronotal stripes united behind; hairs on wing unusually long; hind-spurs hardly equal basal joint. *papago*.
Median pronotal stripes separate; hair of wings normal; hind-spurs equal one and one half joints. *blandus*.
11. Wings heavily spotted, the costal cross-veins spotted at each end. 12
Wings less marked, costal cross-veins not spotted at each end. 13
12. Clypeus black, or with two spots. *versutus*.
Clypeus pale, unspotted. *mexicanus*.
13. Scutelli with no more than median dark line; pronotum with median stripes absent or faint; vertex scarcely marked. *pallidus*.
At least mesoscutellum with double mark. 14

14. Labial palpi about as long as the front-tarsus; lateral stripes partly united to the median pair, tibia dotted *niger*.
Labial palpi plainly a little shorter than the front-tarsus 15
15. Lateral and median stripes united into a very broad stripe each side which contains a pale spot in front, and on outer sides a shorter dark stripe; no pale between bases of antennae *brunneus*.
Lateral stripes more separated from the median pair, and no distinct outer dark stripe toward margin of pronotum 16
16. Mesoscutellum with five black spots; front-femora and tibiae almost wholly pale; hair of the abdomen very short *minusculus*.
Mesoscutellum with two black stripes or a double mark 17
17. Coxae of front-legs with one or two white macrochaetae, four pronotal stripes separate; hind-femora usually dotted; usually three cross-veins before radial sector in hind-wings *hubbardi*.
Front-coxae without macrochaetae, only fine hairs 18
18. Femora dotted, sometimes on the hind-femora dense and connected, but evidently dotted 19
At least hind-femora not dotted, but more or less evenly infuscated . . . 21
19. Median stripes of pronotum united behind; hair on male abdomen long; male appendages long *douglasi*.
Median stripes separated; hair on male abdomen short as in female . . . 20
20. Male appendages equal to last segment of abdomen; rather larger. *carrizonus*.
Male appendages not one half of last segment, rather smaller . . . *texanus*.
21. Vertex with but one row of four dots; interantennal mark does not reach up to vertex; body very pale; male appendages short . . *quadripunctatus*.
Vertex with two rows of marks, or interantennal mark reaches up on vertex over first row 22
22. Male appendages much longer than the height of last segment 23
Male appendages not longer than height of last segment 24
23. Male appendages about half as long as last segment; spines on hind-femora black *assimilis*.
Male appendages nearly equal to last segment; spines on hind-femora white *singularis*.
24. Male appendages not equal to one half of last segment; femoral spines mostly black *ferox*.
Male appendages equal one half of last segment; femoral spines mostly white *intermedius*.

HESPEROLEON FEROX Walker.

Plate 1, fig. 17. Plate 3, fig. 71.

Myrmeleon ferox Walker, Cat. Neur. Brit. mus., 1853, pt. 2, p. 332.

Interantennal mark with little if any extension below, above often reaching first vertex row, but typically separate from it, the latter a

continuous band, second vertex row of two submedian spots with lateral extensions, and often an extension each side behind; last joint of labial palpi moderately swollen, partly black. Pronotum with four lines, usually connected at tips and sometimes in the middle, the median pair of lines rather narrowly separated. Rest of notum marked as in allied forms, mesoscutellum with two streaks, metascutellum with a double mark; pleura mostly dark; femora, especially hind-pair, more or less blackened, tibia sometimes with a dark line below, spines black. Abdomen with a pale stripe each side above, often not as broad as in related species, and sometimes scarcely noticeable in the female, hair very short in both sexes, mostly white, some black along the dorsal line. Wings with mostly dark veins, but little margined, a spot at base of pale stigma, one at rhagma, several along cubitus, sometimes forming short streaks, sometimes an oblique line out from rhagma, anal spot usually very faint, the median vein white in long stretches, radius not dark at end of every cross-vein; hind-wings much less marked.

Vertex high, rather less so in male; pronotum broader than long in middle; hind-spurs but little longer than basitarsus; in fore-wings three cross-veins before radial sector, in hind-wings two, about ten branches to radial sector; a few cubital cross-veins connected; in hind-wing the cubital fork is usually equal to or a little before radial sector, but not much difference, hind-margin near base convex, first anal with five to seven branches, first long, oblique, over six times as long as the cubital cross-vein above it. Abdomen of male much longer than wings, last segment about twice as long as high, appendages very short, divergent, not half as long as in allied species.

Length fore-wing 28 to 34 mm., width 7.8 to 9 mm.

Length hind-wing 26 to 31 mm., width 5.8 to 7.5 mm.

Length abdomen ♀ 23 to 27 mm., ♂ 30 to 37 mm.

Common in far west. *Brachynemurus peregrinus* Hagen is a synonym of this species, I have examined both types.

Specimens examined.—Calif.: Haviilah (TYPE of *peregrinus*); San Bernardino, July; Sierra Nevada Mts., July; Coronado, July; San Francisco. Ore.: Umatilla, June. Wash.: Camp Umatilla; Yakima; Ainsworth. Nev.: Humboldt River; Reno; Verdi, July; Ormsby Co. Ariz.: Thumb Butte; Jerome; Palmerlee; Prescott; Graham Mts., June; Tucson. Utah: Vinyard, June; Beaver Valley, August; Bellevue, June. N. M.: Jemez Mts., July; Albuquerque. Also Beaver Valley, Utah (Brooklyn mus.); California, Oregon (Amer. mus. nat. hist.). Nogales, Arizona (Cornell univ.), Las Cruces, New Mexico (N. M. agric. coll.).

HESPEROLEON ASSIMILIS (Banks).

Plate 1, fig. 19. Plate 3, fig. 65.

Brachynemurus assimilis Banks, Proc. Ent. soc. Wash., 1903, 5, p. 174, pl. 3, fig. 1.

Interantennal mark not extending much below antennae, above usually reaching first vertex row, sometimes with a median pale spot, second vertex row of two spots laterally extended; last joint of labial palpi moderately swollen and partly brown. Pronotum with four lines, all reaching the front-margin, and there connected, and sometimes connected in middle, so that there is a pale streak or two spots each side. Rest of notum marked as usual, two streaks on the scutelli; pleura largely dark; femora more or less embrowned, not dotted, spines black, some on femora are white. Abdomen pale each side above on basal two thirds, leaving a narrow black line, hair moderately long at least in the male, mostly white, but some black along median line. Wings with large dark mark at base of the pale stigma, small spot at rhexma, and several small ones along the cubitus, veins mostly dark, but not bordered, median vein mostly dark, radius dark at end of nearly every cross-vein; hind-wings scarcely marked.

Vertex in female much elevated, in male much less so; pronotum a little broader than long in the middle, not narrowed in front; hind-spurs equal about one and one half joints; male abdomen much longer than the wings, last segment fully three times as long as high, appendages long, slender, subparallel, not much curved, equal to about one half of last segment. In fore-wing three cross-veins before radial sector, in hind-wings two; radial sector with about ten branches; several cubital cross-veins connected; in hind-wings cubital fork is usually a little before the radial sector; hind-margin toward base convex, first anal with about six branches, the first fully six times longer than a cubital cross-vein.

Length fore-wing 30 mm., width 6 to 8 mm.

Length hind-wing 26 mm., width 5 to 7 mm.

Length abdomen ♀ 24 mm., ♂ 32 to 39 mm.

Specimens examined.—Calif.: Tehama, August. (TYPE). Oregon.

HESPEROLEON SINGULARIS (Currie).

Plate 3, fig. 62, 73. Plate 4, fig. 78.

Brachynemurus singularis Currie, Proc. Ent. soc. Wash., 1903, 5, p. 284.

Interantennal mark with a slight median extension, first vertex row of an elongate spot each side, usually without median mark, second

vertex row of four usually connected spots. Last joint of labial palpi not much swollen, brown. Pronotum with four separated brown stripes, the outer ones hardly reach in front of the furrow; rest of notum with large brown spots, often divided, two on mesoscutellum, a median one on metascutellum; pleura much marked with brown; femora (at least hind) more or less embrowned, also with a few small spots; tibiae scarcely marked. Abdomen with pale stripe each side above reaching one half-way to end in male. Wings with dark spot before the pale stigma, at rhagma, and several along cubitus; many cross-veins dark, median interrupted with dark, but largely pale; radius dark at end of each cross-vein; hind-wings scarcely marked. Hair on female abdomen white, that of male partly black, not very short, femoral spines mostly white, tibial black.

Vertex of female considerably elevated, in male less so; pronotum broader than long in the middle; hind-tibia longer than hind-femur, hind-spurs scarcely more than the basitarsus, which is rather long. Last segment male abdomen fully twice as long as high, the appendages as long as segment, much curved. In fore-wing three cross-veins before radial sector, two in hind-wings; radial sector usually with ten branches. In hind-wing hind-margin nearly straight or slightly convex, first anal with about five branches, first oblique and fully five times as long as a cubital cross-vein.

Length fore-wing 22 to 23 mm., width 5.5 to 6 mm.

Length hind-wing 19 to 20 mm., width 5 to 5.5 mm.

Length abdomen ♀ 16 mm., ♂ 20 mm.

Specimens examined.— Ariz.: Florence, October; Colorado River. Also from Utah (Brooklyn mus.), Currie described it from Phoenix, Ariz.

HESPEROLEON INTERMEDIUS (Currie).

Plate 4, fig. 76, 88.

Brachynemurus intermedius Currie, Proc. Ent. soc. Wash., 1903, 5, p. 283.

Interantennal mark small, sometimes extending upward to the first vertex row, rarely with an extension below, second vertex row of two transverse marks; last joint of labial palpi much enlarged, partly brown. Pronotum with four straight complete stripes, connected in front. Rest of notum with streaks and spots, mesoscutellum with two streaks, metascutellum with a basal double mark; pleura largely dark; femora not dotted, but faintly embrowned, especially on hind-legs, sometimes a line below on hind-tibia. Abdomen with two large

streaks above, reaching about to tip, at least in male, hair short, white. Wings with dark spot at base of pale stigma, a spot a rhagma with faint line extending obliquely outward, one or two marks along cubitus, and faint mark at end of anal vein, median vein mostly pale, but some dark marks, radius brown at end of each cross-vein. Vertex of female much elevated, in male less so; pronotum broader than long in middle; hind-spurs but little longer than basal joint, spines mostly black; abdomen of male a little longer than wings, last segment a little more than twice as long as high, the appendages very short, divergent. In fore-wings three cross-veins before radial sector, in hind-wings two; about eight branches to radial sector; several cubitals connected; in hind-wings cubital fork a little before radial sector; hind-margin of hind-wings near base convex, first anal vein with about four branches, first five times as long as a cubital cross-vein above it.

Length fore-wing 21 to 24 mm., width 5.5 mm.

Length hind-wing 19 to 22 mm., width 5 mm.

Length abdomen ♀ 18 mm., ♂ 25 mm.

Specimens examined.—Ariz.: Phoenix, April. Calif: Death Valley, Mono Co., April.

Described by Currie from Phoenix and Wickenburg, Ariz.

HESPEROLEON CARRIZONUS (Hagen).

Plate 1, fig. 20. Plate 3, fig. 61.

Brachynemurus carrizonus Hagen, Can. ent., 1888, 20, p. 93.

Interantennal mark with median extension below, above usually separated from the first vertex row which is a continuous line, second vertex row of two large submedian spots with lateral extensions, rarely reaching eyes; last joint of labial palpi much swollen, mostly black. Pronotum with four stripes, subequal in width, and all reach the front, usually not connected. Rest of notum spotted as usual, mesoscutellum with two stripes, metascutellum with a large double mark; pleura about one half dark; femora much dotted, tibiae less so, spines black, some white on front- and mid-femora. Abdomen with pale stripe each side above, leaving a fairly broad median line, in the female the pale less apparent, hair very short in both sexes, mostly white, but a few black ones intermixed. Wings with veins mostly dark, but not margined, spot at base of pale stigma, a small one at rhagma, and other small ones along cubitus, end of anal vein scarcely marked, median vein

mostly white, dark at ends of a few cross-veins, radius dark at end of nearly all cross-veins.

Vertex of female much elevated, in male not much less so; pronotum broader than long in the middle; hind-spurs little longer than basal joint. In fore-wings three cross-veins before radial sector, in hind-wings two; radial sector with about ten branches; in hind-wings radial sector and cubital fork are often equal or nearly so; hind-margin near base convex, first anal with about four branches, first more than four times as long as cubital cross-vein above it; in fore-wings a few cubital cross-veins connected; male abdomen a little longer than wings, last segment not twice as long as high, the appendages fully equal last segment, slender, upcurved, and toward each other.

Length fore-wing 23 to 27 mm., width 6.5 to 7 mm.

Length hind-wing 21 to 24 mm., width 5 to 5.5 mm.

Length abdomen ♀ 19 to 21 mm., ♂ 24 to 26 mm.

Specimens examined.—Tex.: Carrizo Springs (TYPE); Rio Frio, May; Amarillo; Brownsville, May; San Antonio; Sabinal, May. N. M.: Mesilla, July. Ariz.: Phoenix, August.

HESPEROLEON DOUGLASI, sp. nov.

Plate 1, fig. 16. Plate 3, fig. 63.

Interantennal mark not extending much below the antennae, above usually not reaching the first vertex row, latter rather broad, continuous, second vertex row of two large submedian spots with lateral extensions; last joint of labial palpi moderately swollen, partly brown. Pronotum with four stripes, the median pair united behind, divergent in front, the lateral stripes usually not connected to median ones, sometimes not reaching in front of furrow. Rest of notum spotted as usual, two stripes on the mesoscutellum and a double mark on the metascutellum; pleura largely dark; legs dotted, most prominent on femora, spines mostly black, some femoral ones white. Abdomen with pale stripe each side above, leaving a rather broad median dark stripe, pale less extensive in female, the hair is mostly white, in female it is short and appressed as in *H. carrizonus*, in male long, more erect, three to five times as long as in male of *H. carrizonus*. Wings as in *H. carrizonus* and allies, small mark near stigma, at rhexma and several along cubitus, and one at end of anal vein, venation largely dark.

Vertex of female high, of male moderately high; pronotum broader than long in middle, not narrowed in front; hind-spurs not longer than

basitarsus. In fore-wings three cross-veins before radial sector, in hind-wings two; radial sector with about eleven branches; several cubital cross-veins connected; in hind-wing but little difference between cubital fork and radial sector, hind-margin near base is convex, first anal with about five branches, first very oblique, six times as long as cubital cross-vein above it. Abdomen of male longer than wings, somewhat longer than in *H. carrizonus*, last segment little if any longer than high, appendages very long, longer than last segment, slender, upcurved.

Length fore-wing 25 to 30 mm., width 7 to 8.4 mm.

Length hind-wing 22 to 26 mm., width 6 to 7 mm.

Length abdomen ♀ 22 to 25 mm., ♂ 27 to 31 mm.

Specimens examined.—Calif.: Coronado; Pasadena. Utah: St. George. Ariz.: Nogales (TYPE.—M. C. Z. 15,745), Phoenix; Florence.

Formerly considered *H. carrizonus*, but much longer hair of male abdomen, united median stripes, and minor differences separate it.

HESPEROLEON QUADRIPUNCTATUS Currie.

Plate 4, fig. 77, 96.

Brachynemurus quadripunctatus Currie, Can. ent., 1898, **30**, p. 136.

Interantennal mark small, barely extending below antennae, including a pale median spot; first vertex row absent, second of four well-separated spots; last joint of labial palpi moderately swollen, partly brown; pronotum with four well-separated brown lines, the outer ones sometimes nearly connected to inner pair at anterior end, sometimes these lines are much reduced and nothing shows in front of the furrow; rest of notum with elongate marks, two on mesoscutellum, and a double mark on metascutellum; pleura with brown streaks; femora and usually tibiae unmarked. Abdomen with pale stripe each side on basal part, not always distinct in the female, in male sometimes reaching the tip; hair on abdomen very short, white. Wings with dark spot at base of pale stigma, at rhagma, and sometimes along the cubitus; median vein interrupted with dark a few times, radius usually dark at each cross-vein; hind-wings unmarked. Vertex not much elevated; pronotum broader than long in middle; spines on femora mostly white, on tibia black, short, few being twice the width of joint; hind-spurs but little more than basitarsus; last segment of abdomen about twice as long as high, appendages very short divergent. In fore-wings

usually three cross-veins before radial sector, in hind-wings two, about nine to eleven branches to radial sector; in hind-wing cubital fork before radial sector; hind-margin of hind-wings convex toward base, first anal vein with about four to six branches, first long, oblique, six times as long as cubital cross-vein above it.

Length fore-wing 22 to 27 mm., width 6 to 7.5 mm.

Length hind-wing 20 to 25 mm., width 5 to 6 mm.

Length abdomen ♀ 18 to 19 mm., ♂ 26 mm.

Specimens examined.—Calif: Indio, July; Lancaster, July, August. Ariz.: Phoenix, August.

Currie described a female from San Bernardino Co., California and a long series from Phoenix, Ariz.

HESPEROLEON TEXANUS Banks.

Plate 1, fig. 11. Plate 4, fig. 98.

Brachynemurus texanus Banks, Proc. Ent. soc. Wash., 1903, 5, p. 175, pl. 3, fig. 3.

Interantennal mark small, sometimes with median projection below, and sometimes enclosing a pale spot between antennae; first vertex row usually a continuous line, from eye to eye, second row more broken, the middle spots sometimes more prominent; last joint labial palpi moderately swollen; mostly dark. Pronotum with four lines, submedian pair rather close to each other, sometimes broken at the furrow, laterals more separated, sometimes not reaching forward of furrow, sometimes more developed and connected at tips to submedian. Rest of notum streaked with dark, scutelli with two streaks or a double spot, mesoscutellum often with three spots behind; pleura mostly dark; femora heavily dotted, tibiae less so, spines black. Abdomen with pale stripe each side above, fainter in females, in some males so broad as to extinguish the median dark line. Wings with white stigma, dark mark at base, one at rhexma, one at end of anal vein, and usually several along the cubitus, median vein and radius largely dark, but not at every cross-vein. Hair of abdomen short, mostly white, but some black intermixed. Vertex only moderately elevated in female; pronotum hardly as broad as long in middle, not narrowed in front; hind-spurs a little longer than basitarsus; in fore-wing three cross-veins before radial sector, in hind-wing two; in hind-wing cubital fork usually before radial sector, usually a few cubitals connected, in hind-wing the hind-margin toward base is convex, first anal with about five

branches, the first very oblique and fully six times as long as the cubital cross-vein above it. Male abdomen but little longer than wings, last segment about three times as long as high, the appendages very short and divergent.

Length fore-wing 18 to 20 mm., width 4.5 to 5.5 mm.

Length hind-wing 16 to 18 mm., width 4 to 5 mm.

Length abdomen ♀ 15 to 18 mm., ♂ 25 mm.

Specimens examined.—Tex.: Laredo (TYPE). Kans: Morton Co. N. M.: Albuquerque. Ariz.: Tempe; Phoenix, July. Also Ogden, Utah. Arizona (Amer. mus. nat. hist.). Douglas, Arizona. Clark Co., Kansas (Snow coll.).

HESPEROLEON PALLIDUS (Banks).

Plate 3, fig. 51, 66.

Brachynemurus pallidus Banks, Ent. news, 1899, 10, p. 171.

Interantennal mark very small, and often broken or indistinct, sometimes a median extension below; vertex rows faint, or absent, usually two submedian spots of second row show, and sometimes the first row connected to interantennal mark; last joint of labial palpi not much swollen, partly brown; pronotum little marked, the lateral stripes almost broken, a dark spot behind and one at the furrow, sometimes the median lines show faintly in posterior part; rest of notum pale, mostly unmarked, sometimes a stripe over wing-base, scutelli with faint median line; pleura largely pale; femora and tibiae sparsely dotted if at all, spines black. Abdomen mostly pale on base, a median dark line above, hair in female mostly white, rather long, in male mostly black. Wings very faintly marked, stigma white, cross-veins and the connections mostly dark, but not margined; median vein marked, but not at every cross-vein, radius usually marked at each cross-vein. Vertex in female considerably elevated, less so in male; pronotum hardly as broad as long in middle, not narrowed in front; hind-spurs barely longer than basitarsus; last segment male abdomen but little longer than high, appendages fully as long, curved. In forewings three cross-veins before radial sector, in hind-wings two; radial sector with five to seven branches; few if any cubitals connected; in the hind-wings the radial sector is sometimes equal to or even a trifle before cubital fork; hind-margin faintly convex, first anal vein with about five branches, oblique, the first fully four times longer than cubital cross-vein above it.

Length fore-wing 19 to 21 mm., width 4.5 to 5 mm.

Length hind-wing 16 to 18 mm., width 3.5 to 4 mm.

Length abdomen ♀ 15 mm., ♂ 20 mm.

Specimens examined.—Ariz.: Phoenix, August (TYPE); Florence, October; Prescott, August; Catalina Mts., August.

HESPEROLEON MINUSCULUS (Banks).

Plate 1, fig. 7. Plate 3, fig. 54, 67.

Brachynemurus minusculus Banks, Trans. Amer. ent. soc., 1899, **25**, p. 203.

Interantennal mark brown, emarginate below and with a short median extension, sometimes showing a faint pale spot between antennae; first vertex row of a long mark each side and one or two smaller in the middle, second row not as distinct, but usually the middle spots indicated; last joint of labial palpi much enlarged, black. Pronotum with four black lines, the lateral rather remote from the middle pair, and usually stop at the furrow. Rest of notum spotted with black, mesoscutellum with five spots or dots, the metascutellum with a large double mark; pleura largely dark; front-legs usually unmarked, but mid- and hind-femora may be dark on outer sides, spines mostly black. Abdomen with a pale streak each side above, reaching to tip in some specimens; hair very short in both sexes, white. Wings with dark spot at base of stigma, one at rhexma and sometimes oblique line outward, and more or less along cubitus; median vein dark only at a few cross-veins, radius not dark at every cross-vein; hind-wings not marked.

Vertex moderately elevated in the female, less so in the male; pronotum much broader than long in middle; hind-spurs but little longer than basal joint of tarsus; male abdomen a little longer than wings, the last segment about three times as long as high, the appendages very short, divergent. In fore-wings three cross-veins before radial sector, in hind-wings two; about nine branches to radial sector; a few cubital cross-veins connected; in fore-wing radial sector before cubital fork as usual, in hind-wing cubital fork before radial sector, however not much difference in either wing; in hind-wing the hind-margin is convex, first anal with four to five branches, unequal, the first very oblique, fully five times as long as cubital cross-vein above it.

Length fore-wing 19 mm., width 5 mm.

Length hind-wing 17 mm., width 4 mm.

Length abdomen ♀ 14 mm., ♂ 20 mm.

Specimens examined.—Calif.: Lancaster, July. N. M.: Mesilla, September; Las Cruces.

Currie records it from Winslow, Ariz.

HESPEROLEON BRUNNEUS (Currie).

Plate 1, fig. 14. Plate 4, fig. 97.

Brachynemurus brunneus Currie, Can. ent., 1898, 30, p. 273.

Interantennal mark large, usually with a median extension below, above usually extending up to and uniting with the first vertex row, sometimes a couple of pale spots before the row, second vertex row of two long spots, usually connected, a median spot behind; last joint of labial palpi not much swollen, partly brown. Pronotum with a submedian pair of broad stripes (really four stripes united), each stripe with a pale spot in front-part, laterally there is often a brown stripe reaching to furrow. Rest of notum with dark occupying most of surface, two spots and sometimes a median line on mesoscutellum, metascutellum mostly black; pleura largely dark, some sutures pale; femora dotted, hind-femora largely black, tibiae also dotted, spines black. Abdomen dark, in male with pale line each side above on basal part, hair rather long, largely black, in female much more white on venter. Wings with dark spot at base of the pale stigma, line up from rhexma, several spots along cubitus, and one at end of anal; some cross-veins margined, median largely or wholly dark, radius not dark at end of every cross-vein.

Vertex slightly swollen; pronotum as broad as long in middle, somewhat narrowed in front; hind-spurs scarcely longer than basitarsus. In fore-wings three cross-veins before radial sector, two in hind-wings, some cubital cross-veins connected, about ten branches to radial sector; in hind-wing radial sector usually before cubital fork, hind-margin near base slightly convex, about six to ten branches to first anal vein, but none very long, first more than three times longer than cubital cross-vein above it. Abdomen of male much longer than wings, last segment about three times as long as high, appendages short, about as long as height of segment.

Length fore-wing 24 to 28 mm., width 6 to 7 mm.

Length hind-wing 22 to 26 mm., width 5 to 6 mm.

Length abdomen ♀ 20 to 21 mm., ♂ 33 to 35 mm.

Specimens examined.—Calif.: Claremont; Dunsmuir (COTYPE); Pasadena, June; Mt. Wilson, June; Modoc Co., July; San Gabriel Mts., July; San Jacinto Mts., July; Sawmill Canyon, Kern Co., June. Nev.: Reno; Verdi, July. Utah: Eureka, July; Stockton, July. Ariz.: Palmerlee, July. Colo.: Estes Park, August (TYPE *centralis*); South Park; Golden. B. Col.: Peachlands, July. Also Beaver Valley, Utah

(Brooklyn mus.), Las Cruces, N. M. (N. M. agric. coll.), Nogales, Arizona (Cornell univ.),

Currie records it from Yellowstone National Park, Sage Creek, Wyoming, Dunsmuir and Los Angeles Co., California.

HESPEROLEON NIGER Currie.

Plate 1, fig. 6. Plate 3, fig. 59.

Brachynemurus niger Currie, Can. ent., 1898, 30, p. 134.

Interantennal mark of moderate size above and below antennae, first and second vertex rows arc continuous lines from eye to eye; last joint labial palpi partly dark. Pronotum with the four stripes broad and but narrowly separated, in front the laterals connected to the median; mesonotum mostly dark with two rows of pale spots, mesoscutellum with two dark streaks, metascutellum with a large spot nearly covering it; pleura mostly dark; femora mostly dark, tibiae much spotted, tarsi largely black; abdomen lineate with pale on base, hair rather short, largely white.

Wings heavily marked, large spot at base of the stigma, spot on last connecting cross-vein to radius, line up from rhagma, basal part of cubitus almost continuous streak, and beyond another streak, a short mark up from end of the anal vein, most of the forks distinctly marked; venation largely dark, the pale spaces comparatively few and short; hind-wing with spot at base of stigma.

Vertex moderately well elevated; labial palpi elongated, basal joint as long as the apical, latter much swollen, neither as long as in *Scoto-leon longipalpis*; pronotum about as broad as long in the middle, not narrowed in front; hind-spurs scarcely longer than basitarsus, no coxal macrochaetae; leg-spines mostly black, some on front- and mid-femora white; in fore-wing radial sector before cubital fork, in hind-wing the cubital fork a trifle before radial sector; in fore-wing three cross-veins before radial sector, in hind-wing two; about ten branches to radial sector; hind-margin of hind-wing near base convex, first anal with about eight branches, the first fully six times as long as a cubital cross-vein.

Length fore-wing 26 mm., width 7 mm.

Length hind-wing 24 mm., width 6.3 mm.

Male unknown.

The only specimen I have seen is from Prescott, Arizona. Currie described it from Ft. Grant, and later recorded it from Camp Creek, and Prescott.

HESPEROLEON NIGRILABRIS (Hagen).

Plate 1, fig. 9. Plate 3, fig. 52.

Brachynemurus nigrilabris Hagen, Can. ent., 1888, 20, p. 72.

Labrum black; interantennal mark large, deep black, extending broadly below antennae, and often reaching up to first vertex row, however usually a pale spot or line before vertex row, latter broad, continuous, second vertex row of two large spots near middle, connected in front to first row, and often with extensions behind as well as laterally; last joint of palpi moderately swollen, blackish. Pronotum with four lines, the median pair united behind, slightly separated in front, laterals not reaching in front of furrow, slightly oblique. Rest of notum mostly black on sides and pale in middle, the mesoscutellum with two streaks, metascutellum with a double spot; pleura mostly dark; femora often darkened above near tips, tibia of front pair sometimes much darkened, mid-tibia with subbasal and apical bands, hind-tibia with apical band and line below, spines black. Abdomen black, usually little if any trace of the pale streaks, hair fairly long, white above and below. Wings with large white stigma, veins partly dark, but rarely margined, median almost wholly white, radius dark at ends of cross-veins, sometimes a faint cloud near stigma and at rhexma. Vertex much elevated, somewhat less so in the male; pronotum about as broad as long in the middle; hind-spurs little longer than basal joint; in fore-wings three or four cross-veins before radial sector, in hind-wings two or three; radial sector with about ten branches, only a few if any cubital cross-veins connected; in fore-wing radial sector only a little before cubital fork, in hind-wings the radial sector usually a little beyond cubital fork; hind-margin of hind-wings near base convex, first anal with five or six branches, the first five times as long as a cubital cross-vein. Male abdomen much longer than the wings, last segment two and one half to three times as long as high, appendages about as long as segment is high.

Length fore-wing 26 to 29 mm., width 7.5 to 9 mm.

Length hind-wing 22 to 26 mm., width 6 to 7 mm.

Length abdomen ♀ 20 to 24 mm., ♂ 28 to 36 mm.

Specimens examined.—Colo.: Manitou (TYPE); Garden of Gods, July; Berkeley, June; Colorado Springs; Golden; Boulder, July; Ft. Collins, June; Denver, July; Clear Creek. S. Dak.: Custer Co. Kans.: Seward Co. Utah: Ogden, August; Farmington, July; Vinyard, July; Stockton, June. N. M.: Albuquerque, July; Las Vegas;

Tularosa, August; Mesilla Park, September. Ariz.: Phoenix; Palmerlee, August; Prescott, June, September. Nev.: Franktown. Also Nebraska. In other collections Beaver Valley, Utah (Brooklyn mus.), La Cueva, Organ Mts., St. Augustine, Las Cruces, New Mexico (N. M. agric. coll.), Santa Fe, New Mexico, Nogales, Oracle, Catalina Mts., Arizona (Cornell univ.).

HESPEROLEON BLANDUS (Hagen).

Plate 4, fig. 75, 84.

Myrmeleon blandus, Hagen, Synop., 1861, p. 235.

Interantennal mark goes but little below the antennae, sometimes with short median extension, above usually reaching and including the first vertex row, second vertex row of two submedian spots with more or less distinct lateral extensions; last joint of labial palpi scarcely enlarged, partly brown. Pronotum with four stripes, the median pair well separated, the lateral shorter, rather oblique and arising from the base of the median pair; sometimes the laterals reach forward to front, almost completely uniting with the median pair. Rest of notum with large spots, two dark streaks on the mesoscutellum, a median spot, narrowed behind on metascutellum; pleura largely dark; front-femora and tibiae usually unmarked, other femora dotted, tibiae less so, spines black. Abdomen pale on base above, with a narrow, median, dark line; hair long, largely black. Wings scarcely marked, stigma yellowish, no large spots, the cross-veins partly and other veins at connections and the forks dark, but not margined; hind-wings still less marked. Vertex much elevated in female, less in male; pronotum much broader than long in middle, scarcely narrowed in front; hind-spurs about equal one and one half joints; male abdomen longer than wings, last segment about three or four times as long as high; the appendages slender, curved, one half of the last segment; in fore-wing usually three cross-veins before radial sector, in hind-wings two; radial sector with about nine branches; few if any of cubitals connected; in fore-wing radial sector before the cubital fork, in hind-wing about equal; hind-margin of hind-wings near base concave, first anal with about six to eight branches, all short, and subequal, first about three times a cubital cross-vein.

Length fore-wing 20 to 22 mm., width 4.5 to 5.2 mm.

Length hind-wing 18 to 20 mm., width 3.8 to 4 mm.

Length of abdomen ♀ 19 to 20 mm., ♂ 25 mm

Specimens examined.—N. M.: Pecos River (TYPE); Ft. Wingate, May; Albuquerque, July. Colo.: South Park; Trinidad, June. Wyo.: Bridger Basin. Utah: Provo. Nev.: Verdi, July. Also Colorado (Cornell univ.).

HESPEROLEON PAPAGO (Currie).

Plate 1, fig. 1.

Brachynemurus papago Currie, Can. ent., 1899, **31**, p. 361.

Interantennal mark with median extension usually to clypeus, and often lateral extensions down by the eyes. First vertex row of three linear spots, second row of five, more or less connected; last joint of labial palpi brown, not strongly swollen. Pronotum with four stripes, the medium pair united in posterior half, divergent in front, the lateral bowed outward in anterior part, the lower posterior sides often with one or two brown spots. Rest of notum with many brown spots, mostly linear, a pale median line, two marks on the scutelli; pleura with brown spots and streaks, but upper part largely pale; thorax with many white and some black bristles. Femora and tibiae much dotted, sometimes the dots confluent. Abdomen brown, with a pale line each side above on basal part; dorsal hair rather long, mostly black, some white intermixed, mostly black below. Wings with white stigma, dark spot at base, a spot behind, several along the cubitus, and obliquely up from end of anal. Median vein marked; radius with long streaks of pale and dark, not marked at every cross-vein; hind-wings hardly marked.

Vertex in both sexes but little swollen; pronotum fully as broad as long in middle; hind-tibia longer than femur, basitarsus about equal two joints, hind-spurs hardly equal basal joint; male abdomen longer than hind-wings, appendages very short, not one half of short last segment. All hairs on wing-veins very long, in fore-wing three cross-veins before radial sector, in hind-wings two cross-veins; eight to ten branches of radial sector; several cubital cross-veins and usually a few anals connected; in hind-wing radial sector is usually before cubital fork; near base hind-margin concave, first anal with about six branches, all rather short, subequal.

Length fore-wing 22 to 26 mm., width 5.5 to 7 mm.

Length hind-wing 20 to 23.5 mm., width 5 to 6 mm.

Length abdomen ♀ 22 mm., ♂ 26 to 27 mm.

Specimens examined.—Calif.: San Gabriel Mts., July; Laguna

Beach; Claremont; Stanford Univ. Utah: Coal Creek, Iron Co., June; Hurricane, June, August; Bellevue, June; Provo. Tex.: San Antonio.

Currie described it from Madera Canyon, Santa Rita Mts., Arizona.

HESPEROLEON HUBBARDI (Currie).

Plate 1, fig. 13. Plate 4, fig. 90.

Brachynemurus hubbardi Currie, Can. ent., 1898, 30, p. 241.

Interantennal mark emarginate below, above extending up to and including the first vertex row, sometimes a minute pale spot between bases of antennae, second vertex row of a couple of submedian marks, laterally unmarked or faint. Last joint labial palpi not very large, partly brown. Pronotum with four well-separated brown lines, sometimes the laterals are heavier, and sometimes these or all are interrupted at the furrow, or in small specimens all may be faint, especially in front; rest of notum with elongate marks, two on each scutellum; pleura mostly brown, with many pale spots; femora and tibiae more or less dotted, the spines black, except some on front- and mid-femora; abdomen above on basal part largely pale, with a median dark line, dorsal hair mostly black, ventral white, all fairly long; front-coxae with one or two white macrochaetae, wings with small spot near the stigma, latter white, elsewhere unmarked; veins much interrupted with brown, median vein partly dark, radius marked at end of cross-veins; hind-wings unmarked.

Vertex but little swollen; pronotum about as broad as long; hind-spurs a little longer than basitarsus; last segment of male abdomen about four times as long as high, appendages long, slender, bent beyond middle, about equal one half of last segment. In fore-wings three or four cross-veins before radial sector, in hind-wings also three or four, rarely but two; in hind-wing the radial sector and cubital fork are about equal, radial sector with about ten branches; few if any cubitals connected; hind-margin of hind-wing slightly convex, first anal with about seven to ten branches, first more than three times longer than cubital cross-vein above it.

Length fore-wing 20 to 28 mm., width 5 to 7.5 mm.

Length hind-wing 18 to 25 mm., width 4.5 to 6 mm.

Length abdomen ♀ 19 to 22 mm., ♂ 33 to 38 mm.

Specimens examined.—Ariz.: Phoenix, August; Oracle, August; Reef; Nogales, July; Thumb Butte, July; Palmerlee, July; Huachuca Mts., August. N. M.: Albuquerque. Kans.: Morton Co. Tex.:

Carrizo Springs. Also from Tucson, Arizona (Amer. mus. nat. hist.), Nogales, Oracle, and Huachuca Mts., Arizona (Cornell univ.), Mesilla, La Cueva, Organ Mts., New Mexico (N. Mex. agric. coll.), Huachuca Mts., Arizona (Brooklyn mus.).

Described by Currie from Ft. Grant, Arizona. *Brachynemurus cockerelli* Banks (Ent. news, 1902, **13**, p. 86) is a synonym.

HESPEROLEON HUBBARDI NUBECULIPENNIS (Currie).

Brachynemurus hubbardi nubeculipennis Currie, Proc. Ent. soc. Wash., 1903, **5**, p. 277.

In this variety there is a distinct mark on the rhégma, usually also marks along the cubitus, and more on forks of veins; the species is not as yellow as typical *hubbardi*; and the pronotal stripes are rather more heavy; the male appendages are the same.

Specimens examined.—N. M.: Jemez Mts., July, August. Utah: Bellevue, June; Parowan Canyon, Iron Co., July.

Currie described it from Phoenix and Prescott, Arizona.

In some small specimens from Phoenix, the wings are fairly well-marked, and the insect scarcely yellow. In two from Carrizo Springs, Tex. the pronotal stripes are nearly absent.

In two males (Boulder, Colo., and Seward Co., Kans.) the coloration is as in typical *hubbardi* but the male appendages are much shorter, hardly longer than the height of the last segment. These merit a varietal name as much as the *nubeculipennis* and I propose *Hesperoleon hubbardi* var. *curtus*, var. nov. (Plate 4, fig. 95). The male appendages do not bend downward as in the other forms, and are much shorter, otherwise I cannot find differences.

HESPEROLEON VERSUTUS (Walker).

Plate 1, fig. 23. Plate 4, fig. 85.

Myrmeleon versutus Walker, Cat. Neur. Brit. mus., 1853, pt. 2, p. 331.

Interantennal mark large, shining deep black, extending down on face, with the clypeus or two spots thereon black, usually leaving a pale spot on lower face; upward the mark extends over vertex, leaving a pale spot each side near eyes, in some specimens it does not reach the second vertex row of spots; last joint of labial palpi scarcely swollen, partly black. The pronotum shows the usual four stripes, often well separated, but sometimes united more or less and enclosing a pale

stripe or two spots each side. Rest of notum marked with dark, the scutelli with two streaks; pleura mostly dark brown; femora and tibiae more or less dotted, rarely embrowned; abdomen in male with two pale streaks each side above on basal two thirds or more, the upper streak much the broader, the dark median line sometimes evanescent; female with one pale line above each side on basal part, sometimes indistinct; hair on abdomen mostly black, fairly long. Wings heavily marked with small brown spots, subequal in size; stigma yellow, no line from rhagma nor up from anal vein. Practically every fork and every cross-vein is brown and more or less bordered, the costal cross-veins with spots at each end; hind-wings less heavily marked.

Vertex moderately elevated in both sexes; pronotum as broad or broader than long in middle; hind-spurs equal one and one half joints, femoral and tibial spines black. The male abdomen is but little longer than the hind-wings, the last segment less than three times as long as broad, and the appendages about two thirds of joint. In fore-wings three or four cross-veins before radial sector, in hind-wing two to four; about ten branches to radial sector; usually a few cubital cross-veins connected; in hind-wings the cubital fork is usually a little before radial sector; in the costal area of fore-wings there are several cross-veins connected, but not the series of typical *Brachynemurus*; hind-margin of hind-wings a little convex, first anal with about six or seven branches, first fully three times longer than cubital cross-vein above it.

Length fore-wing 21 to 22 mm., width 5.5 to 7 mm.

Length hind-wing 19 to 20 mm., width 4.5 to 6 mm.

Length abdomen ♀ 17 mm., ♂ 25 mm.

Specimens examined.—N. M.: Pecos; Sapello Canyon. Arizona (Morrison).

HESPEROLEON MEXICANUS (Banks).

Plate 4, fig. 87.

Brachynemurus mexicanus Banks, Proc. Cal. acad. sci., 1895, ser. 2, 5, p. 520.

Very similar to *H. versutus*. Interantennal mark is emarginate just below antennae, and does not extend down on face, nor is there black on clypeus, upward the mark sometimes reaches the second vertex row, sometimes the second row represented by two transverse spots. The rest of markings is the same as in *H. versutus*, the structure is also nearly the same in the female, but in the male the vertex is less swollen than in *versutus* and the male abdomen is very much longer than the wings, all the segments being lengthened, the last one three to four

times as long as high, and the appendages two thirds as long as the segment.

Length fore-wing 23 to 28 mm., width 6.5 to 7 mm.

Length hind-wing 20 to 25 mm., width 5.5 to 6 mm.

Length abdomen ♀ 17 mm., ♂ 37 to 39 mm.

Specimens examined.—Ariz.: Garcia; Palmerlee, September, October.

HESPEROLEON SACKENI (Hagen).

Plate 1, fig. 12. Plate 3, fig. 48.

Brachynemurus sackeni Hagen, Can. ent., 1888, 20, p. 94.

Interantennal mark small, emarginate below in front, the lower part often as two spots, sometimes a pale spot between antennae; first vertex row a transverse line; second row a few spots near middle, not on sides toward eyes, in middle connected to first row, and two extensions behind; often the spots are more or less indistinct. Last joint of labial palpi moderately swollen, partly brown. Pronotum with four lines, the middle pair close together, and sometimes united in front where they are less broad; the lateral lines rarely reach in front of furrow; in many cases the marks run together, and there is another lateral stripe, but the fine median pale line remains. Rest of notum with brown spots; mesoscutellum always largely pale, two dark spots behind, and sometimes two streaks in front; metascutellum pale, with more or less trace of dark median line. Pleura largely dark; femora and tibiae dotted, spines black, some on front- and mid-femora white. The abdomen is banded, the second segment with pale spot at base, middle and tip, the third, fourth, and fifth segments at middle and tip; in the male the pale is more extensive, but not connected to form a stripe. Wings with the cross-veins dark and usually slightly margined so that there are many small spots, but none prominent; three or four rather larger, one at stigma, one at rhexma, one at end of anal vein, and one on cubitus half-way between the last two; median and cubital veins about half dark, but neither dark at end of every cross-vein; there is sometimes a reddish tinge to the pale of the veins. Hair of abdomen long, mostly black, but some white intermixed.

Vertex considerably elevated, less so in male; pronotum but little broader than long in the middle; hind-spurs little longer than the basitarsus; in fore-wing usually three cross-veins before radial sector, in hind-wings two; radial sector with about nine branches; cubitals have few connected; in hind-wing the cubital fork is usually before radial

sector, but not much difference; abdomen slender, longer than wings, last segment in male very short, hardly one half of preceding segment, the appendages very long, curved, about twice as long as last segment. In hind-wing the hind-margin is convex, first anal vein with about four branches, first five times as long as a cubital cross-vein.

Length fore-wing 16 to 27 mm., width 5 to 8 mm.

Length hind-wing 14 to 24 mm., width 4 to 7 mm.

Length abdomen ♀ 14 to 22 mm., ♂ 20 to 28 mm.

Very common in the West.

Specimens examined.—Calif.: Walters Station; San Diego; Johannesburg; Laguna Beach; Havilah. Ariz.: Wenden, June; Congress; Hot Springs; Prescott. Nev.: Verdi, July; Reno. Utah: Zion's Canyon; St. George, June; Coal Creek, Iron Co. N. M.: Ft. Wingate, June; Jemez Mts., June; Pecos, June. Colo.: South Park; Golden, July. Tex.: Brownwood; Kerrville, April; Dallas (TYPE); Phantom Lake, Davis Mts., June. Also from Beaver Valley, Utah (Brooklyn mus.), Las Cruces, New Mexico (N. M. agric. coll.), Nogales, Oracle, Arizona (Cornell univ.).

It was described from Texas and California.

HESPEROLEON YAVAPAI (Currie).

Plate 1, fig. 3. Plate 4, fig. 82, 91.

Brachynemurus yavapai Currie, Proc. Ent. soc. Wash., 1903, 5, p. 281.

Interantennal mark with a median extension below, first vertex row of three brown spots, second row of three connected spots and connected to middle one of first row (in TYPE with posterior third and longitudinal furrow dark); last joint of labial palpi black, moderately swollen. Pronotum with three dark stripes, the lateral ones ending at furrow (in TYPE all united behind and to posterior marginal spot into one large five-pointed mark); rest of notum mostly dark, scutelli pale with faint median line; pleura more or less brown; legs pale, scarcely marked, tarsi paler than usual (in TYPE the tibiae banded with brown, tips of femora and tarsal joints also dark). Abdomen with a large pale band across middle of dorsal segments, ventral segments pale, but with dark before tip, hair very short, black and white intermixed. Forewings with nearly all cross-veins margined with brown; stigma white, not large, with black spot at inner side, radial sector dark at end of each cross-vein; median vein dark, marked with pale; hind-wings scarcely marked, two or three small clouds in upper tip.

Vertex (in male) but little elevated; pronotum broader than long in middle; hind-spurs barely equal basitarsus; male abdomen short, not equal to hind-wing, appendages as long as last two segments. In fore-wings the cubital fork is before the radial sector (unusual in genus); a few cubital cross-veins connected, but no anals; three or four cross-veins before radial sector, latter with seven or eight branches. In the hind-wings the hind-margin is convex, first anal with about four branches, first long, oblique, fully four times the length of a cubital cross-vein; but one or two cross-veins before radial sector. In both wings the cells between medius and cubitus are very long, especially so in the hind-wings.

Length fore-wing 18 mm., width 4.5 mm.

Length hind-wing 16 mm., width 4 mm.

Length abdomen ♂ 15 mm.

Specimen examined.—Utah: Hurricane, June.

Currie's description is based on a female from Hot Springs, Arizona.

I have before me only a male, which differs considerably from the female TYPE in the marks of vertex, pronotum, and legs; but doubtless they belong together.

HESPEROLEON MACULOSUS (Banks).

Plate 1, fig. 8. Plate 3, fig. 60.

Brachynemurus maculosus Banks, Ent. news, 1899, 10, p. 170.

Interantennal mark small, not below antennae and not much above; first vertex row broken in middle and here connected back to the two submedian spots which form the second row; last joint of labial palpi small, mostly pale. Pronotum with four lines, the middle pair united on posterior part, in front of furrow as two spots, laterals distinct, well separated, and reaching only to furrow. Rest of notum mostly pale, scutelli with median elongate spot; pleura mostly dark; femora and tibia unmarked, spines black. Abdomen with pale stripe each side on base, hair mostly white. Wings with many rather large spots, larger than in *H. abdominalis*, mostly on connections of cross-veins and at forks, median wholly pale, cross-veins more widely separated than in *H. abdominalis*; hind-wings with some spots along subcosta and radius, and at ends of cross-veins.

Vertex much elevated; pronotum much broader than long in middle; hind-spurs fully equal to two joints; in fore-wings three cross-veins before radius, in hind-wings but one, radial sector with seven branches,

no cubitals connected, in fore-wing radial sector a little before cubital fork, in hind-wings the cubital fork a trifle before radial sector, in the hind-wing the radial sector arises much before that point in the fore-wing (unusual in the genus), hind-margin of hind-wings near base slightly convex, first anal with three branches, first much oblique, about five times as long as a cubital cross-vein. Male unknown.

Length fore-wing 17 mm., width 4.5 mm.

Length hind-wing 15 mm., width 4 mm.

The single TYPE specimen from Tehama, California, August, is the only one seen.

HESPEROLEON IRREGULARIS Currie.

Plate 1, fig. 4. Plate 4, fig. 94.

Brachynemurus irregularis Currie, Proc. Ent. soc. Wash., 1906, 7, p. 186.

Interantennal mark brown, emarginate below, with a median projection, above reaching up and including both vertex rows, or the vertex rows separate, a median brown spot behind; last joint of labial palpi scarcely swollen, partly brown; pronotum with a broad brown median stripe, much broader behind, and narrowed at furrow. Rest of notum mostly pale brown, with a few pale streaks or spots, scutelli mostly brown, a black dot on middle of hind-margin; pleura mostly brown; femora and tibiae dotted, spines black. Abdomen yellowish brown, with long black hair above and below. Wings much marked with small brown clouds, but no larger spots nor streaks; stigma yellowish, the cross-veins mostly margined and the forks marked with brown, the median vein mostly dark, and radius dark at end of every cross-vein, a row of brown spots between the subcosta and radius; hind-wings less marked. Vertex considerably swollen; pronotum broader than long in middle, but little narrowed in front; hind-spurs not reaching tip of basitarsus; in both wings the radial sector arises before cubital fork; in fore-wing three or four cross-veins before radial sector, in hind-wings two or three; radial sector with eight or nine branches; several cubitals connected, and several cross-veins before radial sector connected; costal hairs and others very long; hind-margin of hind-wing near base concave, first anal vein with about ten branches, all short and subequal, first hardly twice length of cubital cross-vein above it.

Male unknown.

Length of fore-wing 21 mm., width 5 to 7 mm.

Length of hind-wing 20 mm., width 4 mm.

Length of abdomen ♀ 23 mm.

The only specimen examined is from Havana, Illinois. Currie described it from Columbus, Texas and Havana, Illinois.

HESPEROLEON COQUILLETTI (Currie).

Plate 1, fig. 2. Plate 4, fig. 86, 89.

Brachynemurus coquilletti Currie, Can. ent., 1898, 30, p. 93.

Interantennal mark extending barely below the antennae, often with a median extension below, upward it reaches and includes the first vertex row and often the second; last joint of labial palpi but little swollen, part brown. Pronotum with median stripes united behind, forked in front, and lateral stripes to the furrow, where they are sometimes connected to the median. Rest of notum mostly black, the anterior lobe with two pale spots; scutelli pale, each with a median spot, narrowed behind. Pleura mostly black; femora and tibiae pale, rarely marked, spines black. Abdomen in male with a broad pale stripe each side above, in female less noticeable, hair long, white. Wings with yellowish white stigma, few marks, one at stigma, another at rhexma, both small, smaller marks along radius and cubitus and at forks behind; median vein white, marked only toward tip.

Vertex strongly swollen in female, less so in male; pronotum as broad as long in the middle, not narrowed in front; hind-spurs fully equal to two joints; abdomen of male a little longer than the wings, last segment about twice as long as high, appendages very short, divergent. In fore-wing two or three cross-veins before radial sector, in hind-wings two; radial sector with about seven to ten branches; cubitals rarely connected; in fore-wing second anal simple and usually connected but once to first anal; in hind-wing cubital fork about equal to radial sector; in hind-wings the hind-margin is slightly concave, first anal with three branches, first oblique, and fully three times as long as cubital cross-vein above it.

Length fore-wing 17 to 22 mm., width 4.5 to 6 mm.

Length hind-wing 15 to 19 mm., width 4 to 5 mm.

Length abdomen ♀ 16 to 20 mm., ♂ 26 to 28 mm.

Specimens examined.—N. M.: Jemez Mts.; Mesilla, July; Albuquerque, July. Ariz.: Phoenix, September. Tex.: Brownsville, May. Utah: Vinyard, June; St. George, June; Bellevue, June. Wash.:

Pacoima, July. Calif.: Coronado, July. Also Hamilton Co., Kansas (Snow coll.).

Described by Currie from San Simon, Arizona, and San Bernardino County, California.

In most specimens the last radial cross-vein before stigma is more oblique than usual, and so connected as to appear as a separate radial sector.

HESPEROLEON ABDOMINALIS (Say).

Plate 1, fig. 5, 18. Plate 3, fig. 53, 64.

Myrmeleon abdominalis Say, Godman's west. quart. rept., 1823, 2, p. 163; Ed. Lec., 1, p. 173.

Interantennal mark usually with a median extension below, above usually reaching to first vertex row, second vertex row of a pair of submedian spots, little more. Last joint labial palpi scarcely swollen, mostly pale. Pronotum without median lines in main part, but in front of the groove there is usually a trace of two spots, sometimes very distinct, lateral stripes very distinct, reaching only to the groove. Rest of notum largely pale, in the *juvencus* form clear yellow, the mesonotal lobe more or less spotted, and brown stripes over bases of wings, scutelli with a narrow median spot or line; pleura mostly pale to mostly dark; femora pale to finely dotted, tibiae less marked, spines black. Abdomen with broad pale stripe each side above, in the *juvencus* form this extends more to the tip, in the males the apical segment sometimes shows a transverse middle and basal spot. Wings hyaline to yellowish, with many small brown spots, mostly at ends of the cross-veins and on the forks of marginal vein, median vein normally pale, unmarked, radius dark at each cross-vein, stigma yellow. Hair of abdomen mostly black, but more white below.

Vertex high in both sexes, but more so in the female; pronotum about as broad as long in the middle; hind-spurs equal to about two joints; male abdomen much longer than the wings, last segment from two and a half to three and a half times as long as high, the appendages slender, upcurved, usually about one half to two thirds of last segment. In fore-wings two to four cross-veins before radial sector, in hind-wings two or three; about ten radial branches; usually several cubitals crossed; hind-margin of hind-wings near base scarcely concave but sometimes slightly so, first anal vein with six to nine branches, all short, subequal, the first more than three times longer than the cubital cross-vein above it.

There are two forms which, by themselves, look like separate species and were so named by Hagen. One in the south and southwest, *juvencus*, is rather smaller, much more yellow, the lateral marks on pronotum are very definite, and the two submedian spots in front faint or absent. In the female the hair of abdomen is almost wholly white. In the male the abdomen is rather shorter, the last segment distinctly shorter (although somewhat variable in both series) and the male appendages more than one half of the last segment.

Some specimens from the northeastern states (*salvus* Hagen) are much darker, the pronotal stripes rather indefinite, the median area dark or spotted, the median vein mostly dark, and usually a greater number of branches to first anal; but it grades into the normal form.

Length fore-wing 21 to 27 mm., width 5 to 7 mm.

Length hind-wing 20 to 25 mm., width 4.5 to 5.5. mm.

Length abdomen ♀ 19 to 25 mm., ♂ 25 to 33 mm.

Specimens examined.—Ontario: Go Home Bay, July. Manitoba: Treesbank, July. Mass.: West Chop, August; Lexington; Springfield, July. Conn.: New Haven, July. N. Y.: Rochelle; Sea Cliff, August. N. J.: River Edge, Sandy Hook. Md.: Bay Ridge. D. C.: Washington (TYPE of *salvus*). Va.: Falls Church, June; Virginia Beach, August; Cape Henry, July. N. C.: Southern Pines, May. Ga.: Millen, July; Albany, September. Tex.: Dallas; Waco; Pecos River (TYPE of *juvencus*). Kans.: Onaga. Nebr.: Cambridge; Indianola. N. Dak.: Devils Lake, July. Colo.: Ft. Collins; Clear Creek; Denver; Boulder. N. M.: Las Cruces; Zuni. Utah: Provo; Vinyard, June; Salt Lake, August; Eureka. Ore.: Ashland. Wash.: Seattle; Camp Umatilla, July. Calif.: Gazelle, September; Tehachapi, August; Lathrop, August. Also Milton, Massachusetts, Staten Island and Long Island, New York (Davis), Egg Island, Lakehurst, New Jersey (Brooklyn mus.), Raleigh, North Carolina (N. C. state coll.), Albany, Atlanta, Georgia (Cornell univ.), St. Anthony Park, Minnesota (Minn. state coll.), Clark Co., Kansas (Snow coll.), Oregon, Ontario (Amer. mus. nat. hist.).

HESPEROLEON TENUIS (Banks).

Plate 1, fig. 10.

Brachynemurus tenuis Banks, Trans. Amer. ent. soc., 1899, 25, p. 204.

Interantennal mark not much below antennae, sometimes a median line below, above often connected to the first vertex row, but sometimes with pale between, second vertex row of two rather small submedian

spots; last joint of labial palpi slender, partly dark. Pronotum without median stripes, sometimes faintly indicated in front of the furrow, lateral marks distinct, but reach only to furrow. Rest of notum largely pale, scutelli with median line, spots over base of wings usually broken; pleura pale, with a brown stripe above middle and the lower side brown; femora somewhat dotted, tibiae less so, spines black, some on front- and mid-femora white. Abdomen largely pale on basal part, with dark median line above, sometimes absent, hair long, white, in male mostly black. Wings with dots, but mostly in two longitudinal areas, median pale, many cross-veins also pale; most noticeable spots are a series along radius, and a series (twenty or more) rather larger ones along the cubitus, the forks are more or less dark, the stigma whitish; hind-wings with fainter dots along radius and the cubitus largely dark.

Vertex much elevated; pronotum about as broad as long in the middle, narrowed in front; hind spurs fully equal to two joints. Before radial sector in fore-wings two to five cross-veins, in hind-wings two or three; usually several cubitals connected; in hind-wings cubital fork equal to radial sector; the hind-margin near base slightly concave, first anal with about six branches, short and subequal, first about three times as long as a cubital cross-vein.

Length fore-wing 22 to 24 mm., width 6 to 6.5 mm.

Length hind-wing 20 to 22 mm., width 5 to 5.5 mm.

Length abdomen ♀ 18 mm., ♂ 28 mm.

Specimens examined.—N. M.: Mesilla, June, July. Also Douglas, Arizona (Snow coll.).

SCOTOLEON Banks.

Ent. news, 1913, **24**, p. 64.

Similar in most respects to *Hesperoleon*, but the labial palpi are greatly elongated; the legs fairly stout, fifth tarsal joint longer than basal, spurs equal to two joints; abdomen of male but little longer than of female. Costal area of wings simple, Banksian and intercubital lines fairly distinct; second anal of fore-wing runs in a nearly even curve or bends slightly to touch the third, connected twice to third, the second usually simple, the third forked; radial sector in fore-wing much before the cubital fork, in hind-wing often beyond the fork, in hind-wing usually two cross-veins before radial sector; the first anal runs parallel to cubital fork for some distance; second and third anals usually both forked.

TYPE.—*S. longipalpis* Hagen.

SCOTOLEON LONGIPALPIS (Hagen).

Plate 3, fig. 68. Plate 4, fig. 92.

Brachynemurus longipalpis Hagen, Can. ent., 1888, 20, p. 95.

Interantennal mark typically of only a median spot below antennae, but the United States specimens have a spot below each antenna, usually united to form a band; first vertex row of three usually separated spots, second row of four more or less connected spots; pronotum with four stripes, the laterals usually end at furrow in a deep black spot, the submedian pair usually show more or less definitely in front of furrow; rest of notum spotted, largely dark in front, mesoscutellum with two streaks, metascutellum with a large dark spot; pleura mostly dark; femora sometimes more or less infuscated, but often pale and dotted with dark, the hind-femora usually dark toward tip, tibiae usually but little marked. Abdomen more or less narrowly lineate on basal part, hair moderately short, mostly white, but some black above, especially in the male. Wings with distinct dark mark at base of stigma, and a dark, jagged streak (often broken into two or three sections) or a row of spots along cubitus; sometimes a definite mark at rhagma, and at end of the anal. Venation dark, much broken with pale, sometimes many small marks on cross-veins.

Vertex moderately elevated; pronotum scarcely as broad as long in middle, hardly narrowed in front; labial palpi greatly elongated, three times as long as maxillary palpi; hind-spurs almost equal to two joints, spines of legs black; no macrochaetae on front coxae; male abdomen elongate, last segment but little shorter than the preceding, hardly three times as long as high, the appendages pale, divergent, and very short. In fore-wings the radial sector arises before the cubital fork, in the hind-wings usually the opposite; in fore-wings three cross-veins before radial sector, in hind-wings two; radial sector eight to ten branches; hind-margin of hind-wings near base convex, the first anal with six to eight branches, first few long and very oblique, five or six times as long as a cubital cross-vein.

Length fore-wing 19.5 to 26 mm., width 5.5 to 7.5 mm.

Length hind-wing 17 to 23 mm., width 4.5 to 6.5 mm.

Length abdomen ♀ 17 to 22.5 mm., ♂ 25 to 30 mm.

Specimens examined.—Calif.: San Bernardino; Salt Well Valley, Kern Co.; Claremont. Nev.: Humboldt Station, July (TYPE); Reno. Ariz.: Nogales, July; Phoenix, August; Yuma; Hot Springs, July. N. M.: Mesilla, July; Albuquerque. Utah: Bellevue. Tex.: Davis

Mts., June; Marfa, June. Also Nogales, Oracle, Arizona (Cornell univ.), Utah (Brooklyn mus.).

There were eight types, six from Cape St. Lucas, Baja California, and two from Humboldt Station, Nevada. The Baja specimens (which should be types in case of division) have no marks below antennae, but a definite median spot below. In all the United States specimens the median mark is at best barely indicated by a line, but there is a band (or two spots) below antennae. Sometimes these spots are almost absent (Arizona) but the median spot is also absent. The Baja specimens have the hind-tibia simply dotted; in most of the United States specimens the hind-tibiae are dark over part or all of the apical half. In some San Bernardino specimens however the hind-tibiae are dotted. In some Arizona specimens the dark along cubitus is continuous. There is some variation in the length of the labial palpi; the Baja specimens have the enlarged part of last joint fully as long as the stem, while in some of the United States specimens the stem is plainly longer.

NETRONEURUS, gen. nov.

Second anal of fore-wing runs in even curve, not bent toward first anal; the radial sector before cubital fork in fore-wings, and may be also in hind-wings, about two cross-veins before radial sector in hind-wings; the first anal in hind-wings runs for some distance parallel to cubital fork; front-coxae with several curved macrochaetae, and a series of similar bristles above on front-femur; spurs about as long or little longer than basal joint.

TYPE.—*N. carolinus* Banks.

The two species may be separated as follows:—

1. Abdomen (♀) longer than wings; hind-femora dotted all over; cubitals connected; larger, eastern species.....*carolinus*.
2. Abdomen (♀) shorter than wings; hind-femora with dots forming a band near tip; few of any cubitals connected; smaller, western species; wings more spotted.....*pulchellus*.

NETRONEURUS CAROLINUS Banks.

Plate 1, fig. 21. Plate 3, fig. 74.

Brachynemurus carolinus Banks, Trans. Amer. ent. soc., 1911, 37, p. 349.

Interantennal mark with a median line down to clypeus, where there is a transverse mark, upward it extends but a little, usually not reach-

ing the first vertex row, the latter of two long curved lines, second vertex row of large, not very definite submedian spots; last joint of labial palpi but little swollen, partly pale. Pronotum with indistinct marks; a median line, in front of it two spots; a narrow lateral stripe reaching to furrow, and outside this several more or less distinct marks. Rest of notum much marked, mesoscutellum with two streaks, and two shining black spots at base, metascutellum with a large spot; spots over base of wing much broken; pleura mostly dark; femora much dotted, tibiae hardly less so. Abdomen with two or three basal segments usually pale, dark at tip, beyond dark; hair long, mostly black.

Vertex much elevated; pronotum about as long in middle as broad, narrowed in front; front-coxae with some long curved white macrochaetae; and a crest of similar macrochaetae above on front-femora, most of other leg spines black; hind-spurs equal about one and one half joints. Abdomen of female longer than wings, that of male much longer, last segment nearly five times as long as high; appendages long slender, little curved, not one half as long as the last segment. Wings but little marked, venation interrupted with dark; in fore-wings three cross-veins before radial sector (sometimes all connected), in hind-wings two cross-veins; several cubitals connected; in hind-wings the radial sector is usually much before the cubital fork; hind-margin toward base faintly concave, first anal with eight to ten branches, short and subequal, the first not three times as long as a cubital cross-vein.

Length fore-wing 20 to 22 mm., width 4.8 to 5.9 mm.

Length hind-wing 19 to 20.5 mm., width 3.8 to 4.7 mm.

Length abdomen ♀ 20 to 22 mm., ♂ 31 to 32 mm.

Specimens examined.—N. C.: Southern Pines, June (TYPE). Ga.: Millen, July. Fla.: Gotha, April.

NETRONEURUS PULCHELLUS Banks.

Plate 2, fig. 25.

Brachynemurus pulchellus Banks, Trans. Amer. ent. soc., 1911, 37, p. 348.

Interantennal mark covering most of face below and upward to first vertex row, second vertex row a narrow transverse line, with a curved mark each side behind; last joint of labial palpi much swollen, mostly dark. Pronotum with the usual four lines, the middle pair well separated throughout, the laterals connected, except at tip to the median, thus forming a broad stripe each side with a pale spot in front, outside

of these stripes there is a streak in front and a dot behind. Rest of notum mostly dark, mesoscutellum with two streaks and an elongate median spot behind, metascutellum mostly dark; brown over base of wings with two pale dots; pleura largely dark, sutures marked with pale; femora dotted, hind pair with band before tip; front- and mid-tibiae with mark near base and toward tip, hind-tibiae with elongate spots below. Abdomen dark, last segments with small median and apical pale spots. Wings with veins largely dark, but white in streaks and some cross-veins wholly white, stigma with large dark spot at base, short oblique stripe up from rhagma and at end of anal, several along cubitus, and some radial cross-veins margined. Hair of abdomen white.

Vertex of female but little elevated; pronotum not as broad as long in middle; front-coxae with large curved macrochaetae, also similar white macrochaetae above on front-femora, spines largely white, but some black; hind-tibiae longer than hind-femora, hind-spurs barely if any longer than basal joint. Abdomen of female shorter than wings, male unknown. In fore-wings three cross-veins before radial sector, in hind-wings two; no cubitals connected; in hind-wing radial sector about equal cubital fork; hind-margin near base hardly concave, first anal with four or five branches, all short and subequal, first hardly three times as long as a cubital cross-vein.

Length fore-wing 13.5 mm., width 3.6 mm.

Length hind-wing 12 mm., width 2.7 mm.

Length abdomen ♀ 12 mm.

Only specimen seen is the TYPE from Brown, California, October.

BRACHYNEMURUS Hagen.

Can. ent., 1888, 20, p. 34.

Last joint of labial palpi but little swollen; antennae moderately long, clavate; pronotum usually broader than long; legs rather slender, fifth tarsal joint the longest, spurs usually equal to two tarsal joints; abdomen of male much longer than in the female, longer than the wings. Fore-wings with costal area two-celled for at least one half-way; radial sector before cubital fork; second anal runs in even curve, connected twice to the third, both second and third usually forked; the Banksian and intercubital lines fairly distinct. In hind-wings usually two cross-veins before the radial sector, this usually before cubital fork; the first anal runs for some distance parallel to the cubital fork, and connected thereto by several cross-veins; Banksian and inter-

cubital lines rather less distinct than in fore-wings; second and third anal both forked.

TYPE.—*B. longicaudus* Burmeister.

The Nearctic species four in number are easily separated as follows:—

1. Vertex elevated angularly each side, concave in middle; anterior lobe of mesonotum conically elevated each side; pronotum broader than long; antennae short; spines on legs very short; spurs not equal to basitarsus.

tuberculatus.

Vertex evenly convexly elevated; pronotum as long or longer than broad; antennae elongate; spines long; spurs longer than basitarsus. 2

2. Pronotum with a continuous pale median stripe; two dark spots on clypeus; hair on abdomen with much white intermixed; western species.

elongatus.

Pronotum with pale stripe only on anterior part if at all; hair on abdomen mostly dark; eastern species. 3

3. At least six of radial cross-veins with large dark clouds as broad as high, also large spots at rhagma, end of anal and along the cubitus, and at rhagma in the hind-wings. *ramburi.*

The spots on radial cross-veins are much smaller, not half as wide as high, nor any large spots elsewhere. *longicaudus.*

BRACHYNEMURUS LONGICAUDUS Burmeister.

Plate 2, fig. 28. Plate 3, fig. 70.

Myrmeleon longicaudus Burm., Handb. ent., 1839, 2, p. 994.

Interantennal mark, often not very dark, extending obliquely below antennae and sometimes with a median line below, above sometimes reaching first vertex row, usually not, vertex mostly dark, the rows more or less run together. Last joint of labial palpi but little swollen, partly brown. Pronotum with marks often indistinct, usually a very broad median stripe, with pale spots in front of furrow; laterally the pronotum has a dark streak often merging with the brown. Rest of notum largely brown, with pale, more or less indistinct spots, scutelli largely dark; pleura mostly dark; femora dotted, tibiae less so, all with long hair and spines, the latter mostly black, but some white especially on front-femora; front-coxae with several macrochaetae. Abdomen mostly dark, but with more or less definite pale stripe each side above on basal part, in male sometimes entire basal segments pale, hair long, black. Wings but little marked, spots at rhagma and along cubitus, and at end of anal sometimes more distinct; venation mostly dark.

Vertex moderately elevated, emarginate in middle, rather concave between the two vertex rows; pronotum longer than broad; sides of anterior lobe of mesonotum roundedly humped; spurs nearly equal two tarsal joints, front-tarsus longer than front-tibia. Abdomen of male exceedingly long, slender, last segment fully four times as long as high, appendages short, divergent, hardly as long as height of segment.

Wings rather broad; two series of costal cells more than one half-way to base; in both wings radial sector before cubital fork, but not much so in hind-wings; in fore-wings three cross-veins before radial sector, in hind-wings two; nine or ten branches to radial sector; several cubitals connected; hind-margin of hind-wings slightly concave, first anal vein with eight to ten branches, short and subequal, first not three times as long as a cubital cross-vein; hairs of wing rather long and very numerous.

Length fore-wing 21 to 23 mm., width 4.9 to 6 mm.

Length hind-wing 20 to 22 mm., width 4.2 to 5.2 mm.

Length abdomen ♀ 22 to 23 mm., ♂ 35 to 36 mm.

Specimens examined.—N. J.: Lakehurst. N. C.: Southern Pines, June. Ga.: Millen, July; St. Simon's Isl., September. Fla.: Ormond; Cedar Keys; Crescent City; Gotha, July. *Also* St. Simon's Island, Georgia (Cornell univ.) Beaufort, North Carolina (N. Car. state coll.), Florida (Brooklyn mus.).

BRACHYNEMURUS RAMBURI Banks.

Plate 3, fig. 58.

Brachynemurus ramburi Banks, Cat. Neurop., 1907, p. 31.

Interantennal mark hardly below antennae, sometimes a median extension, and a mark across at base of clypeus, above the mark usually extends over vertex, sometimes the vertex spots are more separated, usually some pale each side near eye, behind is an oval brown spot. Last joint of labial palpi but little swollen, mostly brown. Pronotum largely brown, obscurely marked, three pale spots in front, sometimes one each side near middle. Rest of notum mostly dark; the scutelli pale, with a median dark line; pleura mostly dark; femora spotted, tibia less so, spines mostly black, some white ones on front-femora, front-coxae with several white macrochaetae. Abdomen mostly dark, some of basal segments sometimes largely pale, with dark tips, most noticeable in male; hair black. Wings heavily spotted,

about twelve or fourteen large spots, one each side of stigma, about six just above radial sector, one at rhagma, usually two others along cubitus, and one at end of anal. Venation mostly dark, but more white in places than in *B. longicaudus*, many cross-veins narrowly margined and small spots at forks; in hind-wings the cross-veins slightly margined, and the rhagma usually marked.

Vertex moderately high; pronotum longer than broad; front-spurs more than two joints, hind-spurs nearly two joints; the anterior lobe of mesonotum is hardly as plainly humped as in *longicaudus*; male abdomen very long (as in *longicaudus*), last segment about three to three and one half times longer than high, the appendages equal height of segment, rather longer than in *longicaudus*.

Wings fairly broad; double costal series reaching more than one half-way to base; before radial sector in fore-wings three cross-veins, in hind-wings, two; about nine branches to radial sector, usually a few cubitals connected; in both wings radial sector before cubital fork, but little so in hind-wings; hind-margin of hind-wings faintly concave, first anal with eight to ten branches, short and subequal, the first not three times as long as cubital cross-vein above; hair on wings rather long and abundant. Structurally very similar to *B. longicaudus*.

Length fore-wing 21 to 24 mm., width 5 to 6.5 mm.

Length hind-wing 20 to 22 mm., width 4.5 to 5.2 mm.

Length abdomen ♀ 23 to 25 mm., ♂ 35 to 37 mm.

Specimens examined.—N. C.: Southern Pines, May. Ga.: Millen, July. Fla.: Gotha, April. Also Chester, Georgia (Cornell univ.).

BRACHYNEMURUS ELONGATUS Banks.

Plate 1, fig. 15. Plate 3, fig. 57.

Brachynemurus elongatus Banks, Trans. Amer. ent. soc., 1904, 30, p. 105, pl. 1, fig. 10.

Interantennal mark extending obliquely below antennae on each side, above not reaching up on vertex, often with a pale dot between the antennae, two dark spots on the clypeus, first vertex row a continuous line, second vertex row of several more or less connected spots, and behind in middle is an oval brown spot. Last joint of labial palpi but little swollen. Pronotum with four stripes, the median pair well separated, the laterals united near middle and at tip, thus leaving two pale spots each side, laterally there is another stripe. Rest of notum much spotted, mesoscutellum with two streaks, metascutellum

with a large double mark; pleura mostly dark; femora much dotted, tibiae also much marked, but hind-tibia mostly below, spines long mostly black, but some long white ones on femora, front-coxae with several macrochaetae. Abdomen above often all dark, in some with a few pale spots and streaks above on basal part, in male with a long pale stripe each side above, hair fairly long, mostly black, but some white intermixed. Venation mostly dark, interrupted with pale, radius with long streaks of pale, a large black spot at base of stigma, a line up from rhexma, less distinct at end of anal, and several marks along cubitus, marginal forks also dark, median vein mostly dark.

Vertex high, but evenly convexly elevated; pronotum not as broad as long in the middle; front-spurs equal two joints, hind-spurs longer than basal joint. Male abdomen very much longer than wings, last segment five times as long as high, appendages short, divaricate. Wings moderately narrow; costal series double for usually one half-way, in fore-wings three cross-veins before radial sector, in hind-wings two, eight to ten branches of radial sector, usually a few cubitals connected, in both wings radial sector before cubital fork, in the hind-pair but slightly so; hind-margin of hind-wings scarcely concave, first anal with about ten branches, none long, but first three or four times as long as a cubital cross-vein, rather longer than usual in the genus; hair on wing, especially costal hair, short.

Length fore-wing 23 to 25 mm., width 6 to 6.5 mm.

Length hind-wing 20 to 22 mm., width 5 to 5.5 mm.

Length abdomen ♀ 20 to 21 mm., ♂ 36 mm.

Specimens examined.—N. M.: Mesilla (TYPE); Las Vegas, July. Ariz.: Prescott. Colo.: Golden; South Park; Platte Canyon; Berkeley. Utah: St. George, June.

BRACHYNEMURUS TUBERCULATUS Banks.

Plate 3, fig. 69, 72.

Brachynemurus tuberculatus Banks, Can. ent., 1899, 31, p. 70.

Interantennal mark large, extending across below antennae and with a median line below, upward it connects with the dark of the vertex. Back of each vertex tubercle is a pale area, and in middle behind a velvety black spot crossed by a faint median line. Pronotum with the stripes more or less united to form one broad stripe, with two pale spots in front; laterally there is a dark streak. Rest of notum mostly dark, a few pale spots, scutelli mostly black, the mesoscutellum

with faint median line; pleura largely dark; femora becoming black toward tip, tibia with dark marks before middle and near tip, spines mostly black, all very short, none on femora as long as width of joint, front-coxa with one white macrochaeta. Abdomen dark, with a small pale spot near middle and sometimes one each side near tip of several segments, hair fairly long, mostly dark, but much white intermixed. Wings little marked; venation mostly dark, interrupted with pale, many cross-veins with dark dot in middle, median vein mostly dark, dark spot at base of stigma, a line up from rhagma, and less distinctly at end of anal.

Vertex much elevated, each side back of the antennae in a cone, between them the ridge is concave; pronotum broader than long in middle; each lateral corner of anterior lobe of the mesonotum elevated conically and the tip with a group of stiff short bristles; spurs short, not equal to basitarsus. Abdomen of female shorter than hind-wings; in male but little longer, last segment scarcely as long as high, appendages slender, more than twice as long as last segment, down-curved, much divergent at base, below with spines, outside with fine hair.

Wings rather narrow; in fore-wings three cross-veins before radial sector, in hind-wings two; about eight branches to radial sector; the crossed costals reach more than one half-way to base; in both wings the radial sector arises before cubital fork, but less so in the hind-wings; hind-margin of hind-wings near base slightly concave, the first anal with six to eight branches, short and subequal, the first about twice as long as a cubital cross-vein.

Length fore-wing 14.5 to 21 mm., width 3.3 to 5 mm.

Length hind-wing 14 to 19 mm., width 2.9 to 4 mm.

Length abdomen ♀ 15 to 16 mm., ♂ 16 mm.

Specimens examined.—N. M.: Mesilla (TYPE). Ariz.: Santa Rita Mts., July.

CALINEMURUS Banks.

Can. ent., 1899, 31, p. 70.

Last joint of labial palpi much swollen; antennae moderately long, clavate; pronotum fully as long as broad; legs rather slender, the hind-tibia longer than the femur, basal tarsal joint much shorter than the fifth, spurs as long as basal joint or more; abdomen of female scarcely as long as wings, in male longer. Fore-wing with costal area two-celled most of way, sometimes partly three-celled, in hind-wings sometimes two-celled for a short distance near stigma; radial sector

before cubital fork in both wings; Banksian line distinct, intereubital line rather less so; four to six cross-veins before radial sector in fore-wing, two to four in hind-wing, usually several are connected; in fore-wing the second anal runs in even curve, but usually touches the third at one point, two or three cross-veins to third, both second and third usually forked; in hind-wings the first anal runs parallel to cubital fork, and is connected thereto several times; the second anal forked, the third usually simple; much of the venation in both wings is irregular.

TYPE.—*C. californicus* Banks. Mexico.

CALINEMURUS FUSCUS Banks.

Plate 4, fig. 100.

Calinemurus fuscus Banks, Trans. Amer. ent. soc., 1906, **32**, p. 6.

Interantennal mark large, extending much below antennae and straight across, first vertex row a nearly continuous line, second more broken; last joint labial palpi slightly swollen, partly brown; antennae brown. Pronotum almost wholly dull brown, a median pale line, and one or two lines on the sides; rest of notum mostly dark, with some pale spots, mesoscutellum with a pair of pale submedian spots, and lateral corners pale, metascutellum mostly dark; pleura almost wholly dark; femora and tibiae heavily dotted, the spots sometimes confluent, spines mostly black, some white ones, a row of white ones above on front-femur, and a series of white macrochaetae on front-coxae. Abdomen with basal segments slightly lineate above pale, densely long-haired, almost wholly dark. Venation mostly dark, and often slightly bordered with dark, larger dark spots at base of stigma, up from rhcgma, several along cubitus, and one at end of anal; space between radius and subcosta fumose.

Vertex moderately elevated; pronotum hardly broader than long in middle, not narrowed in front; front spurs about one and one half joints, hind-spurs little longer than basitarsus; abdomen of male a little longer than hind-wings, last segment hardly twice as long as high, the appendages long, upcurved, rather longer than last segment. Wings long and slender; venation very dense; in fore-wings three series of costal cells for most of distance, in hind-wings two series for two thirds of distance; in both wings radial sector much before cubital fork, in fore-wings five to eight cross-veins before radial sector, several connected, in hind-wings two or three, partly connected; about thirteen branches to radial sector; cubital cross-veins mostly connected;

in hind-wings the hind-margin near base is hardly concave, the first anal vein with about ten or eleven branches, the first about four times as long as a cubital cross-vein; hairs on veins rather short, but very numerous.

Length fore-wing 28 mm., width 6.8 mm.

Length hind-wing 25.5 mm., width 5.5 mm.

Length abdomen ♂ 27 mm.

Ariz.: Nogales, July (TYPE).

CLATHRONEURIA Banks.

Ent. news, 1913, **24**, p. 64.

Last joint of labial palpi much swollen; antennae moderately short, rather strongly clavate; pronotum broader than long; legs fairly stout, fifth tarsal joint much longer than first, spurs equal to two joints. Abdomen in both sexes longer than the wings, in male much longer than in female. Costal area of wings simple; radial sector in fore-wings before the cubital fork, in hind-wings usually so; second anal of fore-wing runs in even curve, connected but once to the third, the second usually simple, the third usually forked. In hind-wing two cross-veins before radial sector; first anal bends down to the margin near cubital fork, usually both the second and third anals forked.

TYPE.—*C. schwarzi* Currie.

The two species may be separated as follows:—

1. Pronotum with median as well as lateral stripes or marks; abdomen with pale at base and apex of segment.....*schwarzi*.
Pronotum with only the lateral marks; abdomen with pale only at tips of segments.....*delicatulus*.

CLATHRONEURIA SCHWARZI (Currie).

Plate 4, fig. 79, 99.

Brachynemurus schwarzi Currie, Proc. Ent. soc. Wash., 1903, **5**, p. 280.

Interantennal mark of moderate size, rather emarginate below, first vertex row of three brown spots, second row of four spots, in middle behind is a brown spot; last joint of labial palpi not much swollen, mostly pale; antennae pale, dark near tip. Pronotum with four or six brown stripes, the submedian pair broad, reaching to front, and close together, sometimes almost united in part, lateral stripes end at furrow, and outside usually another, shorter stripe; rest of notum much

marked with brown; a double stripe on mesoscutellum, and double spot on the metascutellum; pleura spotted, but about half pale; femora mostly dotted, tibiae with subbasal and preapical dark marks, spines rather long, many black, but some white ones; abdomen banded with pale at base, middle, and apex of segments, sometimes apical part is darker, hair quite long, largely black, but white in patches. Wings with pale venation, the cross-veins and connections nearly all dark brown, and often faintly bordered, no large dark marks, stigma white.

Vertex considerably elevated; antennae short, strongly clavate; pronotum about as long in middle as broad, but little narrowed in front; front-spurs equal three joints, hind-spurs equal two joints; abdomen in female as long as hind-wings, in male very much longer, last segment about four times as long as high, appendages moderately long, fully one half as long as last segment, curved near base and outwardly near tip.

In both wings the radial sector arises a little before cubital fork; in fore-wings three cross-veins before radial sector, in hind-wings two; about eight branches to radial sector; several cubitals connected; last radial cross-vein very oblique; hind-margin of hind-wings slightly concave, first anal vein with about four, short, subequal branches; hairs on veins rather long.

Length fore-wing 21 to 26 mm., width 5 to 7.5 mm.

Length hind-wing 18.5 to 23 mm., with 4.5 to 6.5 mm.

Length abdomen ♀ 22 to 24, ♂ 30 to 39 mm.

Specimens examined.—Calif.: San Gabriel Mts., September. Ariz.: Palmerlee. Utah: Eureka, July; Stockton, August. N. M.: La Luz, August; Jemez Mts., July.

Currie described it from Flagstaff and Williams, Arizona.

CLATHRONEURIA DELICATULUS (Currie).

Plate 2, fig. 30.

Brachynemurus delicatulus Currie, Proc. Ent. soc. Wash., 1903, 5, p. 279.

Interantennal mark with a short median extension below, a yellow spot just above the antennae; vertex dark, a pair of pale spots at middle of hind-border, and less distinct spots on sides and front. Antennae dark, basal joint pale; palpi dark; pronotum pale, a pair of dark stripes, broad and approximate behind, narrowed and widely separate in front, and end in the furrow; rest of notum dark, spotted with pale; pleura

with yellowish spots; legs pale, unmarked, with black and some white spines. Abdomen dark, a pale line each side, and tips of the segments pale. Wings not marked, except dark at base of stigma; venation pale and dark. Spurs equal four joints; male abdomen longer than wings, appendages very short; wings slightly falcate at tip; second and third anals of fore-wings not forked, connected once; hind-wing with hind-margin concave near base, first anal with two or three short branches.

Length ♂ 18 mm., expanse 33 mm., width fore-wing 4.3 mm.¹

Phoenix, Arizona, May.

AUSTROLEON Banks.

Journ. N. Y. ent. soc., 1909, 17, p. 3.

Last joint of labial palpi swollen; antennae very short, clavate; pronotum a little longer than broad, or broader than long; legs rather stout, basal tarsal joint much shorter than the apical, spurs equal to one or more joints, front-coxae and front-femora above with a comb of long curved white bristles. Abdomen shorter than wings, in male longer. Wings rather narrow, acute at tips, costal area simple, radial sector usually before cubital fork in both pairs, second anal in fore-wing runs in a nearly even curve, with one short cross-vein to the third or touching the third; second anal forked, third usually forked. In hind-wing both second and third anals are forked, the first anal bends down to margin near cubital fork. Before radial sector in fore-wing three cross-veins, in hind-wing two; Banksian and intercubital lines faint or absent.

TYPE.—*A. dispar* Banks. South America.

Three Nearctic species are referable to this genus which is better represented in South America.

1. Three shining black spots on the mesoscutellum; abdomen somewhat transversely banded with pale; wings broad, spots between radius and subcosta..... *tripunctatus*.
Not three shining spots on scutellum; the abdomen more lineate; wings narrow, less spotted, no marks between radius and subcosta.....2
2. Pronotum pale through a broad middle area, dark on sides; front-spurs equal to three tarsal joints.....*dorsalis*.
Pronotum dark, with three pale lines; labial palpi about twice as long as maxillary palpi; front-spurs equal to four tarsal joints.....*barberi*.

¹ Description mostly from Currie.

AUSTROLEON DORSALIS (Banks).

Plate 1, fig. 22. Plate 4, fig. 83.

Brachynemurus dorsalis Banks, Journ. N. Y. ent. soc., 1903, 11, p. 240.

Interantennal mark a little above and below antennae, usually including a pale transverse spot just above antennae; vertex wholly dark, rarely showing distinction into two rows; palpi pale. Pronotum with a broad pale median area, dark on the sides; rest of notum mostly dull black, the scutelli usually with large median mark, pleura much spotted with dull black; femur of front-pair mostly dark above, others dotted, and with large spot toward tip, tibiae with subbasal and apical mark, hind-tibiae somewhat lineate below. Abdomen lineate with pale, especially with the male on basal part, but toward tip with pale median spot on segments above. Wings scarcely marked, a faint spot at rhexma and at end of anal; veins pale, interrupted with dark, cross-veins usually more or less dark. Hair of abdomen white; spines on legs mostly white.

Vertex considerably elevated; antennae short, strongly clavate; pronotum longer than broad, rather narrowed in front; legs short, front-femora plainly longer than tibiae; a row of bristles on femur above and several bristles on front-coxae; hind-spurs equal two joints; male abdomen much longer than hind-wings, last segment six or more times as long as high, appendages pale, short, divergent, about as long as height of segment. In both wings the radial sector before cubital fork; in fore-wings three cross-veins before radial sector, in hind-wings two; about seven branches of radial sector; last connecting veinlet between radius and radial sector is heavier and more oblique than the others so that it appears like an extra radial sector; hind-margin of hind-wing near base concave, first anal with about five branches, all short and subequal.

Length fore-wing 17 to 20 mm., width 4 to 5 mm.

Length hind-wing 15 to 18 mm., width 3 to 4 mm.

Length abdomen ♀ 18 to 20 mm., ♂ 25 to 28 mm.

Specimens examined.—Tex.: Laredo (TYPE); Mercedes, July; Dallas; Brownsville, May; Sabinal, September; Hondo.

The *Brachynemurus curriei* of McClendon grades into *dorsalis*.

AUSTROLEON BARBERI (Currie).

Plate 2, fig. 24.

Brachynemurus barberi Currie, Proc. Ent. soc. Wash., 1903, 5, p. 282.

Interantennal mark small, a median extension to clypeus. Vertex dark, a band in front pale, vertex rows shining fuscous. Antennae dark, with narrow, pale annulations. Labial palpi about twice as long as maxillary, dark brown. Pronotum dark, with three pale lines, one median and two lateral ending in the furrow; rest of notum dark, with a few pale spots. Legs with femora mostly dark, and dark bands on tibiae, spines black, but many white ones, those on front-femora above long and white. Abdomen with indistinct pale spots on middle of segments. Wings with few dark spots, mostly along cubitus, a dark spot at base of whitish stigma, and an oblique streak up from rhexma. Pronotum longer than broad; spurs as long as first four tarsal joints in front-legs, as long as first three in other legs. Wings shorter than abdomen, narrow; in fore-wings the second anal is not forked, is connected but once to the third anal which is forked.

Length ♀ 23 mm., expanse 38 mm., width fore-wing 4.3 mm., Hot Springs, Arizona, June (Barber and Schwarz).¹

AUSTROLEON TRIPUNCTATUS (Banks).

Hesperoleon tripunctatus Banks, Can. ent., 1922, 54, p. 60.

Interantennal mark rather large above and below antennae, but not reaching up on the vertex, first vertex row a continuous line, second of several spots, the largest lateral, and a median spot behind; labial palpi with tip much swollen and partly dark; pronotum with four spots in front, a long median mark behind and lateral stripes, the long median mark more or less divided; rest of notum with large dark spots, tip of mesoscutellum with three shining black spots, one on the metascutellum, bristles on thorax large, some white; pleura largely dark; the femora and tibiae much dotted, long spines on legs mostly white, front-coxae with white macrochaetae, and a row of similar ones above on femur; abdomen with rather irregular pale marks at base and middle of segments, hair mostly black, but white on pale areas. Wings much spotted with small marks, some between subcosta and radius, larger at rhexma and end of anal; many cross-veins wholly dark; veins white, with dark streaks.

Vertex moderately elevated; antennae rather short, strongly capitate; pronotum a little longer than broad, hardly narrowed in front;

¹ Description mostly from Currie.

legs rather short, femur of front-pair rather longer than tibia, hind-spurs about equal to one and one half joints; abdomen nearly as long as hind-wings. In both wings the radial sector arises much before the cubital fork; in fore-wings three cross-veins before radial sector, in hind-wings but one; seven branches to radial sector; hind-margin of hind-wings near base concave, first anal with five or six branches, all short, subequal; hair on wings rather long.

Length fore-wing 22 to 25 mm., width 6 to 7.5 mm.

Length hind-wing 20 to 23 mm., width 5.5 to 6.5 mm.

Length abdomen ♂ 23 mm.

Specimens examined.—Ariz.: Palmerlee, June, July (TYPES).

At first the species looks much like *Hesperoleon sackeni*; it is rather abnormal for *Austroleon*, and may yet form a new genus.

CHAETOLEON Banks.

Bull. M. C. Z., 1920, 64, p. 328.

Last joint of labial palpi swollen; antennae long, with almost capitate tip; pronotum longer than broad. Legs very slender, the front-tibia is equal to front-femur, latter with a crest of long white bristles, and also comb on front-coxae, spurs about equal to two joints; mesonotum with some enlarged, fusiform bristles above. Abdomen shorter than hind-wings. Wings rather narrow, acute at tips; in fore-wings the costal area simple; radial sector before cubital fork in both pairs; second anal runs in even curve, and then unites with the third anal for short distance; both the second and third anals forked. In hind-wings the first anal bends down to margin near forking of cubitus; before the radial sector in fore-wing three cross-veins, in hind-wings two; Banksian and intercubital lines faint or absent.

TYPE.—*C. pumilis* (Burmeister).

The two closely related species can be separated as below:—

1. Pronotum black, except anterior lateral angles, rest of notum mostly black; fore-wings rather heavily marked. *pumilus*.
Pronotum much marked with pale, as also the rest of the notum; wings less marked. *pusillus*.

CHAETOLEON PUMILIS (Burmeister).

Plate 2, fig. 40.

Myrmeleon pumilus Burm., Handb. ent., 1839, 2, p. 995.

Interantennal mark large, much below antennae, and extending up to first vertex row and often to the second, usually a pale spot each side

below the first vertex row; palpi mostly pale; antennae annulate, tip dark; pronotum largely dark, usually only anterior corners pale; rest of notum almost wholly dark, sometimes a pale spot above fore-wing; large heavy enlarged spines on mesonotum; pleura mostly dark; femora largely dark, tibiae with subbasal and apical dark bands, spines long, partly white; abdomen with pale spot in middle of segments, or at least the basal ones. Wings with about a dozen fairly large spots, several between subcosta and radius, and continued on the cross-veins behind, one at rhagma, three others along cubitus, and one at end of anal, a few other smaller marks, mostly at forks of veins.

Vertex moderately elevated; pronotum longer than broad; legs very slender; tibiae fully equal to femora, and much longer than tarsi, hind-spurs equal to two joints, a comb of white bristles on front-coxae, and above on front-femur; abdomen of male short, not as long as hind-wings, the short, pale appendages sometimes apparent; hair of abdomen mostly white. In both wings the radial sector arises before cubital fork; in fore-wing three cross-veins before radial sector, in hind-wing but two; about six branches to radial sector; hind-wing with the hind-margin near base concave, the first anal with four to six branches, all short and subequal; hairs on wing rather long.

Length fore-wing 15.5 to 17.5 mm., width 4 to 4.5 mm.

Length hind-wing 15 to 16.5 mm., width 3 to 3.5 mm.

Length abdomen ♀ 12.5 to 15 mm., ♂ 14 mm.

Specimens examined.—South Carolina (TYPE). N. C.: Southern Pines, May, June. Ga.: Millen, July. Fla.: Lake Worth. Also Florida (Brooklyn mus.).

CHAETOLEON PUSILLUS (Currie).

Plate 2, fig. 27.

Brachynemurus pusillus Currie, Can. ent., 1899, **31**, p. 363.

Interantennal mark a little below and above antennae; first vertex row a continuous line; second close to it of a lateral spot and a median connection, and a median spot behind; palpi mostly pale; antennae pale, ringed with dark and darker at tip; pronotum with four spots in front, the submedian pair larger and nearly touching, behind them a long median spot, sometimes with median pale line, several lateral spots; rest of notum much spotted, the scutelli with large median spot, sometimes small lateral ones; pleura much spotted; front-femora mostly dark above, other femora with preapical band, all tibiae with subbasal and apical bands. Abdomen with pale irregular spots

on middle and tip of several segments; thorax with many long mostly white bristles, some on the mesonotum black and much thickened; hair on the abdomen white, moderately long. Wings with several spots between subcosta and radius, one at base of stigma, elongate one at rhagma, and several above cubitus, and one at end of anal, small marks on forks and on some cross-veins, veins mostly white with long streaks of dark.

Vertex moderately elevated; pronotum longer than broad; legs very slender, femur not longer than tibiae, hind-tibia much longer than tarsus, hind-spurs about equal to two joints; spines long, mostly white, front-coxae with curved macrochaetae and a row of similar ones above on front-femur. In both wings the radial sector arises much before cubital fork; in fore-wings three cross-veins before radial sector, in hind-wings two; about six branches to radial sector; hind-margin of hind-wings near base slightly concave, the first anal with five branches, short and subequal; hair on wings rather long. Abdomen of male no longer than female, much shorter than hind-wings, appendages not projecting.

Length fore-wing 14 to 18 mm., width 3.5 to 5.5 mm.

Length hind-wing 13 to 16.5 mm., width 2.9 to 4 mm.

Length abdomen ♀ 12 to 15 mm., ♂ 14 mm.

Specimens examined.—N. M.: Mesilla Park; Las Cruces. Utah: Parowan Canyon; Coal Creek, Iron Co., June; Eureka, July. Also Santa Rita Mts., Arizona (Snow coll.). Currie described it from Ft. Grant, and Madera Canyon, Santa Rita Mts., Arizona.

MARACANDULA Curtie.

Proc. Ent. soc. Wash., 1901, 4, p. 436.

Last joint of labial palpi but little swollen; antennae short, capitate; pronotum rather longer than broad; legs slender, basal tarsal joint longer than the fifth, claws small, spurs absent; abdomen short in both sexes, and shorter than wings. Wings rather short and broad; costal area simple; radial sector in both pairs before the cubital fork; neither Banksian nor intercubital lines; second anal runs in even curve and is connected twice to the third anal. In hind-wing one to three cross-veins before radial sector, and the first anal bends down to the margin near cubital fork, usually both second and third anals are forked.

TYPE.—*M. pygmaea* (Hagen). Mexico.

The generic characters were drawn from *bellula*; when *pygmaea* is better known a new genus may be required. Most of the characters

apply to that species, but the apical tarsal joint is longer than the basal, and there are four cross-veins before the radial sector in hind-wing.

MARACANDULA BELLULA Banks.

Trans. Amer. ent. soc., 1906, **32**, p. 7.

Face pale, a brown interantennal mark, emarginate below antennae, and extending above a short distance (sometimes faint); vertex with two rounded dark spots; palpi pale; antennae brown, a pale band of about three joints beyond middle; pronotum pale, and oblique brown spot on each outer side in front, sometimes traces of median spots, and a large brown spot behind in middle (sometimes all spots are faint), hair almost wholly white; rest of notum pale to brown, more or less obscurely spotted with brown, hair white, except some dark on the anterior lobes; pleura more or less brown, with several pale spots, hair white; legs pale, the femora streaked or dark at tip, tibiae dark at tip and often near base, middle tarsal joints dark. Abdomen dull black, segments with pale spots on base above, basal segments largely pale, hair below white, above white on pale areas, rest dark. Wings with small brown spots, base of stigma black, several brown spots between the subcosta and radius and extended back on cross-veins, several along upper edge of cubitus, at rhagma, and at end of anal vein, marginal forks scarcely clouded, and sometimes faintly along hind-margin at ends of veins. Hind-wings scarcely spotted, but a cloud at rhagma, and one at stigma; venation in both wings brown and white alternating.

Pronotum little longer than broad; vertex much elevated, bilobed; legs slender, basal tarsal joint elongate. Wings broad, especially toward tip; four to six cross-veins before radial sector in fore-wing, one to three in hind-wing, some often connected; cubitals not crossed; radial sector with five branches; hind-margin of both wings concave at base; in fore-wing about seven to ten short subequal branches to the first anal vein, in hind-wing about four such branches; venation with many rather long curved hairs.

Length fore-wing 15 to 20 mm., width 4.8 to 6.2 mm.

Length hind-wing 13 to 18 mm., width 3.1 to 4.2 mm.

Length abdomen ♀ 10 to 14 mm., ♂ 13 mm.

Specimens examined.—Calif.: Three Rivers, San Jacinto Mts. Utah: Coal Creek, Iron Co.; Eureka, August; St. George, June. Ariz.: Reef, June; Palmerlee, June, July. Also Santa Rita Mts., Arizona (Snow coll.). Phoenix, Arizona (Adams coll.).

MACRONEMURINAE.

This subfamily is represented by four very distinct genera grouped in two tribes. In the tropics there are several other tribes and a great number of species. The Nearctic genera are tabulated as follows:—

1. Legs very slender, femora cylindric, front-femur about twice as long as front-coxae and longer than height of thorax; pronotum usually longer than broad (*Glenurini*) 2
- Legs not especially slender, femora somewhat thickened, front-femur less than twice as long as front-coxae, nor longer than height of the thorax; pronotum usually broader than long. (*Macronemurini*) 3
2. Hind-wings with large dark spot near tip; broadest at or beyond rhegma.
Glenurus.
Hind-wings without large spot, broadest rather before the rhegma.
Eremoleon.
3. Fore-wing with two series of costal cells for part way; venation dense and irregular *Puren*.
Fore-wing with but one series of costal cells; venation open and regular.
Psammoleon.

PSAMMOLEON Banks.

Can. ent., 1899, **31**, p. 69.

Labial palpi with last joint swollen; antennae moderately long, not much separated at base; pronotum rarely longer than broad; abdomen short in both sexes, and much shorter than the wings. Legs moderately stout, hind-tibia shorter than or equal to hind-femur, basal joint of tarsus short or elongate, spurs equal to two or three joints in front-legs, and to one and one half to two and one half joints in the hind-legs. Wings moderately broad to narrow, the costal area simple, radial sector much beyond the cubital fork in fore-wings, in hind-wing radial sector near base, one cross-vein before it. In fore-wing the second anal is united to third for a long distance; no distinct Banksian line; in hind-wing the second anal is forked, and the third anal is connected at tip to a short vein close to the hind-margin, and almost united to it. The fore-wings show more or less distinctly a dark line or spot at end of anal, and a similar mark up from rhegma.

TYPE.—*P. ingenuus* (Walker). South America.

Five species are known from southern parts of the Nearctic region and may be separated as follows:—

1. Tarsi black, hind-femora, as well as others, mostly black; basal tarsal joint elongate, spurs also elongate, but little curved, hind-spurs not equal to two tarsal joints, last ventral segment of male with black hair. 2

- Tarsi mostly pale on basal and apical joints, hind- and mid-femora at least mostly pale, and dotted with dark, spurs curved, hind-spurs equal to or longer than two joints, basal tarsal joint less elongate, last ventral segment of male with white hair as rest of venter. 3
2. Abdomen wholly black, not spotted; pronotum about as long in middle as broad, male appendages with a projection at lower corner, hind-tibia equal hind-femur. *connexus*.
Abdomen with two elongate pale spots on each segment above; pronotum much broader than long in middle, male appendages without projection at lower tip. *bistictus*.
3. Abdomen with two elongate spots on each segment above; hind-spurs equal to two joints; cubital area of hind-wing narrow, with but one series of cross-veins, superior appendages of male extended below, but no projection behind. *minor*
Abdomen with two rounded spots on some of the segments, scarcely marked toward tip; hind-spurs equal to two and one half joints; cubital area of hind-wings broad, with two or three series of cross-veins, male superior appendages with a distinct projection behind at lower tip. 4
4. Fore-wings with two dark nearly parallel streaks. *guttipes*.
Fore-wings with the two streaks connected to make a sinuous line. *sinuatus*.

PSAMMOLEON BISTICTUS (Hagen).

Plate 2, fig. 33.

Myrmeleon bistictus Hagen, Synop., 1861, p. 235.

Interantennal mark extending considerably below antennae, above the surface is sericeous and on the vertex also, the vertex scars are black; last joint of labial palpi mostly black; antennae scarcely annulate; pronotum dull black, sericeous, with pale median line, and broader pale streak on each side; rest of notum dull black, with a number of pale spots, mostly through the middle area; pleura dark, with a few pale spots, hair white; legs largely black, front-femur pale in front, mid- and hind-femora with pale band or spot beyond middle, tibiae pale at base, and a pale spot or streak on outer side, tarsi almost wholly black, femora and tibiae with white hair and many black bristles. Abdomen dull black, sericeous, each dorsal segment with a long pale streak each side, sometimes divided into two spots; hair white, but in male that of last ventral is black. Wings not heavily marked, the usual two oblique lines from anal and from rhexma, latter pointing to apex of wing; a dark spot at base of stigma, some marginal forks clouded, otherwise not marked, venation dark and pale in streaks;

hind-wings unmarked, except at stigma, the median and first anal vein wholly pale.

Pronotum plainly broader than long in middle; basal joint of tarsi elongate, spurs elongate, scarcely curved, the hind-spurs about equal one and one half joints, front-spurs equal to two joints. Fore-wings with costals simple, seven cross-veins before radial sector, ten branches to this sector; in hind-wings the cubital area is fairly broad with two or three series of cross-veins. The superior male appendages are not produced behind at lower corners.

Length fore-wing 29 mm., width 7 mm.

Length hind-wing 27 mm., width 5.7 mm.

Length abdomen 17 mm.

Specimens examined.—Fla.: Dry Tortugas, June.

Described from Cuba, where it is not uncommon.

PSAMMOLEON MINOR, sp. nov.

Plate 2, fig. 32, 42.

Interantennal mark extending straight across below antennae, above is a pale area before the vertex rows, which are black; palpi pale; antennae plainly annulate, base pale; pronotum dull black, a median pale line, and lateral spots fairly distinct; rest of notum dull black, with several pale spots, a pair on the mesoseutellum, and the middle tips of both scutelli also pale; pleura with much pale, hair white; legs pale, femora and tibiae rather sparsely dotted, both dark at tips, tips of tarsal joints dark, femora with many black and some white bristles and appressed white hair. Abdomen dull black, much marked with pale, venter mostly pale, above each segment has the tip and an elongate spot each side pale, some apical segments with a median spot, hair white above and below in both sexes, bristles around genitalia black. Wings with the venation interruptedly pale and dark in streaks, dark spot at base of stigma, near end of anal, and a short streak up from rhagma, a few apical veinlets margined; hind-wings scarcely marked, faint dot at stigma, rhagma, and one apical cross-vein.

Pronotum a little broader than long in middle; tarsi with basal joint somewhat elongate, more so than in *guttipes* the spurs also elongate and not much curved, the hind-spurs just about equal to two joints. Wings slender, scarcely any costals before stigma forked, six cross-veins before radial sector, latter with nine or ten branches; in hind-wings the cubital area is very narrow, and has but one series of

cross-veins. Superior appendages of the male have no projection behind, but are rather lobed below.

Length fore-wing 22 mm., width 5 mm.

Length hind-wing 21.5 mm., width 4 mm.

Length abdomen 12 mm.

TYPE.—M. C. Z. 15,746. ♂, ♀. Fla.: Dry Tortugas, Loggerhead Key, June (J. McClendon, and H. L. Clark).

PSAMMOLEON GUTTIPIES Banks.

Plate 2, fig. 38, 43.

Psammoleon guttipies Banks, Psyche, 1906, 13, p. 99.

A black band below antennae, above brown up to and on vertex, usually leaving the vertex scars showing pale, but sometimes they are covered by dark velvety brown; palpi mostly pale; antennae narrowly annulate, base pale; pronotum dull brown, a faint pale median line and sometimes one or two spots on each side; rest of notum dull brown, slightly sericeous, a few pale spots, often a pair in front of the metascutellum; pleura dark, with a few pale spots, hair long, white; legs pale, femur and tibia much dotted, front femur sometimes dark above, tibia dark at tip, basal and apical tarsal joints mostly pale, femora and tibiae with many black bristles and hairs, and some more appressed white hair, less noticeable; abdomen dull black, a pale spot above on each side near middle of several segments shows more or less distinctly, sometimes united, hair short, mostly white. Wings but little marked, but there are two subparallel streaks or lines in front-wings, one up from the end of anal, the other from the rhagma, the latter so directed that it would end on costa long before apex of wing, usually some apical cross-veins and forkings are marked, and several radial cross-veins margined; venation dark and pale in streaks; hind-wings scarcely marked, a few cross-veins margined, a dot at rhagma, and outer marginal forks marked. Pronotum much broader than long; legs rather stout, hind-tibia not quite as long as hind-femora, basal tarsal joint short, hardly equal to next two together; spurs stout, strongly curved, in front-legs fully equal to three joints, in hind-legs about two and one half joints. The costal area of fore-wings is fairly broad, about seven cross-veins before radial sector, latter with about eleven or twelve branches; in hind-wings the cubital area is quite broad with two or three series of cross-veins. The superior appendages of the male have a projection at the lower tips.

Length fore-wings 29 to 31 mm., width 6 to 7.5 mm.

Length hind-wings 28 to 30.5 mm., width 5 to 6 mm.

Length of abdomen 19 mm.

Specimens examined.— N. C.: Tryon (Type); Southern Pines, June. Ga.: Millen. Florida. La.: Shreveport. Tex.: Travis Co.; San Antonio; Dallas, August. Also Lakehurst, New Jersey (Davis coll.), Brownsville, Texas (Brooklyn mus.), Spring Creek, Georgia (Cornell univ.).

PSAMMOLEON SINUATUS Currie.

Plate 2, fig. 34.

Psammoleon sinuatus Currie, Proc. Ent. soc. Wash., 1903, 5, p. 275.

This in general agrees with *P. guttipes* and was described as a variety of that species. It is a western form of that species. The interantennal mark usually does not extend under the antennae, the vertex scars are marked deep black, the lateral marks of pronotum are usually more distinct, the legs and the abdomen are marked the same. The fore-wings have the two oblique lines, normally connected so that it makes a sinuous or serpentine mark, the outer part of this mark points toward the apex of the wing (thus differing from *guttipes*). In the hind-wing the rhagma is usually well marked, and the veins behind it to the margin are bordered with dark. The rest of the wings is not as much spotted as in *guttipes*. Structurally it is about the same as *guttipes*, but the superior appendages of the male have not such a long, but more acute projection at the lower tip.

Length fore-wing 29 to 35 mm., width 6.5 to 9 mm.

Length hind-wing 28 to 34 mm., width 5 to 7 mm.

Length abdomen 20 mm.

Specimens examined.— N. M.: Jemez Mts., August. Ariz.: Palmerlee, July. Utah: Coal Creek, Iron Co., June.

Currie described it from the Santa Rita Mts., Arizona, and recorded it from Bear Creek Canyon, Colorado.

PSAMMOLEON CONNEXUS (Banks).

Plate 2, fig. 35, 44.

Puren connexus Banks, Bull. M. C. Z., 1920, 64, p. 329.

Interantennal mark deep black, extending somewhat below antennae, above dull black to sericeous on vertex, the vertex scars deep black; last joint of labial palpi mostly black; antennae very narrowly

annulate; pronotum dark, a median pale line, and a streak or two pale spots on each side; rest of notum dark, a few pale spots and streaks, usually two on the mesoscutellum; pleura largely dark, hair white; legs mostly dark, femora pale within or beneath, and some pale on tibiae behind, tarsi almost wholly black, femora and tibiae heavily clothed with long white hair, very noticeable, some black bristles below. Abdomen dull black, not spotted, hair very short, white but the last two ventral segments have dense black hair. Wings with venation mostly dark, pale in spots and patches; a dark spot at base of stigma, a short streak at end of anal, a longer one up from rhexma (in the TYPE these are connected in a sinuous line), the outer line points toward the apex of the wing, apical forks often marked, the radial cross-veins not margined, but often some veins behind the radial sector are margined to make a streak, and the cubitus is sometimes margined from rhexma toward base; hind-wings less marked, but sometimes the cubitus is margined toward the rhexma. Pronotum rather longer than in the other species, nearly as long in middle as broad; legs with basal tarsal joint elongate, and so are the spurs, so that they are little curved except near tip, and the hind-spurs are only equal to one and one half joints. In the fore-wings there are usually a few costals before the stigma forked; six or seven cross-veins before radial sector, the latter with about nine or ten branches; in the hind-wings the cubital area usually has two series of cross-veins, at least for part way. The superior appendages of the male have a rather short, sharp projection at the lower tips, not as long as in *guttipes*.

The TYPE specimen has a remarkable venational peculiarity; instead of the short oblique cross-vein representing the median fork, there is a very long branch, occupying the space of about three cells and ending just before the fork of cubitus.

Length fore-wing 25 to 30.5 mm., width 5.7 to 7 mm.

Length hind-wing 24.5 to 29.5 mm., width 4.5 to 5.5 mm.

Length abdomen 19 mm.

Specimens examined.—Calif.: San Jacinto Mts., June (TYPE). Ariz.: Palmerlee, July. Tex.: Austin.

PUREN Navas.

Revis. Chil., 1911, 15, p. 125.

Last joint of labial palpi swollen; antennae rather long, but little separated at base, pronotum scarcely broader than long; the abdomen much shorter than the wings; legs rather short, femora somewhat

thickened, spurs elongate, but little curved, equal to two joints in front-tarsi, and little more than one in hind-tarsi, hind-tibia rather shorter than hind-femur. Wings of moderate width, in fore-wing the second anal is united to third for a long distance, basal cubital fork distinct, costal area broad, partly two-celled, radial sector much beyond the cubital fork, in fore-wing the Banksian line is fairly distinct; in hind-wings the first anal runs parallel to cubital fork for a very short distance.

TYPE.—*P. bellator* Navas. Chile.

I have not seen the genotype, the species I have placed here differs from *Psammoleon* only in partly double costal area, and denser venation; in tarsal and spur characters it agrees closely with *Psammoleon connexus* and *P. bistictus*.

PUREN INSCRIPTUS (Hagen).

Plate 4, fig. 80, 93.

Myrmeleon inscriptus Hagen, Synop., 1861, p. 230.

Interantennal mark extending a little under the antennae, above less black up to the vertex which is sericeous, the vertex scars black; last joint of labial palpi black; antennae narrowly annulate; pronotum dull black, with a pale median line, and each side with a pale rounded spot in the front-part and a longer streak in the hind-part; rest of notum dull black, sericeous, with some pale spots mostly in middle area; pleura partly dark, with much pale below, hair white; legs mostly black, front-femur pale at base and within, hind-tibia pale at base behind, hair largely white, but some black especially on tibiae; abdomen dull black, the apical margin of segments above pale, hair short, white. Fore-wings heavily marked, two oblique lines, one up from end of anal, the other from rhexma, and pointing toward apex of wing, sometimes the two lines faintly connected; a large spot at base of stigma, and extended behind over last radial cross-vein; longitudinal veins mostly black, but marked with pale in streaks, cross-veins almost wholly black, and nearly all are slightly margined. There are about four patches of white veins, just behind the radius and over the radial sector. Hind-wings much less marked, a spot at stigma, venation mostly dark, but few veins margined except the outer forks, median vein wholly pale.

Pronotum about as long in middle as broad; tarsi with basal joint elongated, equal to next two joints or more; spurs elongate, scarcely

curved, front ones equal to two joints, hind spurs scarcely longer than basal joint. Costal area of fore-wings fairly broad, many of the costal veins forked, and about one third to one half of them crossed, mostly near the middle of length; seven cross-veins before radial sector, one or two crossed, about twelve branches of radial sector, several costals crossed; cubital area of hind-wings fairly broad, two or three series of cross-veins; all venation dense and irregular. The male superior appendages have a projection at lower tip.

Length of fore-wing 28 to 31 mm., width 6 to 7.5 mm.

Length of hind-wing 26 to 29 mm., width 5 to 6 mm.

Length of abdomen 20 mm.

Specimens examined.—N. M.: Pecos River (TYPE); Las Vegas. Utah: St. George, May.

GLENURUS Hagen.

Stett. ent. zeit., 1866, **27**, p. 372.

Last joint of labial palpi swollen; antennae long and slender, less than diameter of basal joint apart; pronotum longer than broad; legs very slender, basal tarsal joint elongate, sometimes equal to the fifth; spurs elongate, little curved, equal to two joints; abdomen much shorter than wings. Wings very broad toward tip, and the hind-pair at least with large spots, costal area simple, radial sector in fore-wings beyond the cubital fork, but before end of anal vein, first branch of radial sector beyond end of anal, basal cubital fork distinct, no Banksian nor intercubital line; in hind-wing the second anal forked, the first anal bends down to margin near cubital fork, no short vein parallel to hind-margin at base and connected to third anal.

TYPE.—*G. gratus* (Say).

In a South American species (*incalis*) there is the beginning of a Banksian line close to the median and curving upwards, as in the African genus, *Cymothales*.

The two Nearctic species belong to two different sections of the genus and may be separated as follows:—

1. Extreme tips of wings dark; fore-wing with large clear space near apex rosy; hind-wings with the large dark spot leaving two clear spaces; legs dark; first anal in hind-wings ends beyond the cubital fork. *gratus*.
 Extreme tip of wings pale; fore-wings with the space beyond large spot broken by many small spots; hind-wings with the large dark spot leaving three clear spaces; legs mostly pale; first anal in hind-wings ends before cubital fork. *snowi*.

GLENURUS GRATUS (Say).

Plate 2, fig. 45.

?*Formicaleo grata* Say, Journ. Acad. nat. sci. Phil., 1839, 8, p. 45. Ed. Lec., 2, p. 413.

Face black, the lip and a band below antennae pale; vertex dark, a pale line in front and one behind; palpi and antennae dark; pronotum black, a pale median line which is widened in front, near middle, and behind; rest of notum black, with pale median line more or less complete, mesoscutellum with two pale spots; pleura black with scattered white hair; legs reddish brown, hind-tibia behind and the tarsi pale, hair and bristles black, front-tibia at tip beneath with yellowish hair. Abdomen black, tips of the segments sometimes narrowly pale above, hair fine short and black. Wings with a large compound dark spot just before tip in both pairs, this spot is made up of three large spots, closely united in hind-wings, less so in front-pair. In fore-wings beyond the spot the wing is whitish with a rosy tint, the extreme apex dark, and dark clouds along outer hind-margin; at end of anal a rather large spot, a number of smaller spots along cubitus, and dark streaks between subcosta and radius, venation mostly dark, but many longitudinal veins are white in spots. In hind-wing beyond the large trilobed spot the wing is also pale, with less distinct rosy tint, the extreme tip also black, the large spot reaches the hind-margin in two places, and in the pale apical part there is a small dark spot, almost connected to the large trilobed spot, venation almost wholly dark. Basal tarsal joint about as long as apical, spurs equal two joints; wings broad toward tips which are almost rounded; fore-wings with about ten cross-veins before radial sector, about eleven branches to radial sector, sometimes a few cubitals are crossed. In hind-wings the cubital area is broad, with four to five series of cross-veins, the first anal running parallel to cubital fork for a short distance, and usually connected once or twice to it.

Length fore-wing 34 to 47 mm., width 9 to 15 mm.

Length hind-wing 33 to 45 mm., width 8.4 to 13 mm.

Length abdomen ♀ and ♂ 24 to 25 mm.

Specimens examined.—Ohio: Cincinnati. Ky.: Bee Spring, Cumberland Gap. Tenn.: Redboiling Springs. Fla.: Lake Worth.

GLENURUS SNOWI Banks.

Ent. news, 1907, **18**, p. 100.

Face black, pale on side under each eye, vertex pale, the vertex scars black; palpi and antennae dark brown; pronotum black, with pale median line; rest of notum also black, and with an incomplete pale median line, hind-edge of the mesoscutellum pale; pleura black, hair white; legs pale, femora darkened above and near tip, tibiae dark near base and at tip, tarsal joints less distinctly dark at tip, hairs and bristles mostly black, but front-tibiae at tip beneath with yellowish hair. Abdomen dull black, some segments narrowly pale above at tips, hair on venter white, but that on last segment dark, above with white hair near base. Fore-wings with a large dark spot near tip broken up into many small, mostly confluent, rounded spots, the space beyond pale, but with some small spots, a large spot at end of anal, two or three along margin beyond it, and several before it, a number between median and cubitus, the space between subcosta and radius dark and extending behind in several places, elsewhere (mostly in apical part) are numerous small dots at connection of veins; venation largely dark, but white in places. Hind-wing with a very large, rather four-lobed dark spot near tip, leaving a space on costal margin, the tip, and a space on hind margin pale; dark streaks between subcosta and radius; venation partly dark and pale. Legs hardly as long as in *G. gratus*, the basal tarsal joint not as long as apical, the spurs equal two joints. The wings are less broad toward tip than in *G. gratus*, the apex almost acute; seven cross-veins before radial sector in fore-wing, ten branches to radial sector; in hind-wings the cubital area is broad, with three or four series of cross-veins; the first anal bends down before cubital fork.

Length fore-wing 35 mm., width 10 mm.

Length hind-wing 33.5 mm., width 8.6 mm.

Length abdomen 19 mm.

Specimen examined.—Ariz.: Baboquivari Mts. (TYPE).

There is a second specimen in the Snow collection.

EREMOLEON Banks.

Trans. Amer. ent. soc., 1901, **27**, p. 365.

Last joint of labial palpi but little swollen; antennae rather long and slender, not the diameter of basal joint apart; pronotum longer than broad; legs very long and slender, hind-tibia longer than hind-femur,

basal tarsal joint shorter or hardly equal to apical; spurs about equal to two joints or more; abdomen shorter than wings. Wings moderately broad, broadest before rhagma; costal area simple; radial sector plainly beyond the cubital fork, about opposite end of anal vein; second anal united to the third for a short distance, sometimes both forked; no Banksian line. In hind-wing but one cross-vein before radial sector, second anal forked, third connected at tip to a short vein parallel to margin of wing, first anal bends down at cubital fork.

TYPE.—*E. macer* (Hagen).

Differs from *Glenurus* greatly in appearance, but structurally very similar, the wings are broader toward middle, while in *Glenurus* they are broader toward tip; the venation, especially toward apex, is much less dense than in *Glenurus*, but the absence of large spots readily separates it.

The two Nearctic species are separated in the following table:—

1. Fore-wings at base with a prominent black spot, no distinct spot at end of anal, cross-veins almost entirely dark, femora plainly dotted. *nigribasis*.
Fore-wings without prominent black spot at base, a distinct mark at end of anal, many cross-veins entirely pale, femora scarcely if at all dotted.

macer.

EREMOLEON MACER Hagen.

Plate 2, fig. 31, 39.

Myrmecleon macer Hagen, Synop., 1861, p. 236.

Face pale, interantennal mark black, extending below but scarcely above antennae; vertex gray, vertex scars of first row brown or black, others scarcely marked; palpi and antennae pale, tip of latter brown; pronotum pale, scarcely marked with dark, sometimes a paler median stripe, a dark dot each side on the furrow; rest of notum pale, traces of dark spots, and a paler median line; pleura pale; legs pale, femora unmarked except dark at tips, tibiae dark at tips and spotted on outer side, tarsi pale, tip of last joint dark, bristles and hairs black, or yellowish. Abdomen dull brown, segments with large pale spot above, larger on basal segments, venter mostly pale, hairs white. Wings but little marked, a brown spot at base of stigma, one at rhagma, and one at end of anal, several radial cross-veins faintly margined with brown, also some faint clouds along the cubitus, and a few elsewhere, none very definite; venation mostly pale, but with brown streaks; hind-wings unmarked, but the pale venation is broken with dark. In fore-wing nine or ten cross-veins before radial sector, none connected,

about six branches of radial sector, no cubitals crossed; hind-wings with cubital area fairly broad with about three series of cross-veins.

Spurs slender, scarcely curved except at tip, front spurs equal about two and one half joints, hind-spurs equal about two joints; in front-tarsus the basal joint is about two thirds of the last, in hind-tarsus the basal joint about equal to last.

Length fore-wing 28 mm., width 8.5 mm.

Length hind-wing 27 mm., width 7 mm.

Length abdomen 18 mm.

Specimens examined.— Ariz.: Garcia; Palmerlee. Also Mexico (TYPE).

It has been redescribed by Navas as *Segura vitreus*, Mexico.

EREMOLEON NIGRIBASIS Banks.

Plate 2, fig. 26.

Eremoleon nigribasis Banks, Bull. M. C. Z., 1920, 64, p. 329.

Face below yellowish, above more gray and also on vertex, almost no trace of interantennal mark, a few irregular spots on vertex; palpi and antennae pale, latter dark at tip. Pronotum reddish gray, traces of marks each side near middle, and a dark streak on each side; rest of notum reddish gray, with many small dark spots or streaks; pleura pale, with two broken dark stripes; legs pale, femora and tibiae dotted with brown, latter dark at tips, bristles black; abdomen reddish gray, each segment with a large black spot above, usually near tip, hair short, white.

Wings with no large marks, brown spot at base of stigma, at rhegma, and a prominent black spot at base; longitudinal veins pale, marked with brown, cross-veins almost wholly dark, in many cases very narrowly margined; hind-wings unmarked except faint spot at rhegma, veins pale, with few dark spots. In fore-wings six cross-veins before radial sector, none crossed, about eight branches of radial sector, no cubitals crossed; in hind-wings cubital area fairly broad, with two or three series of cross-veins. Spurs more curved than in *macr*, front-spurs equal nearly two and one half joints, hind-spurs almost equal two joints; basal joint of front-tarsus but little more than one half of the apical, basal joint of hind-tarsus about two thirds of apical.

Length fore-wing 24 to 27 mm., width 6.3 to 7.5 mm.

Length hind-wing 22 to 25 mm., width 5 to 6 mm.

Length abdomen 14 to 15 mm.

Specimens examined.— Utah: St. George, June (TYPES).

MYRMELEONINAE.

This, the most specialized subfamily, is readily separable into two tribes, each of which is found in all the regions of the world.

1. Claws much curved or bent; thorax above and on pleura, as well as the legs with very long, mostly white hair, hair on legs much longer than the black bristles; the sense-hair at base beneath of femur as long as femur; body rather stout; basal tarsal joint as broad as long. . . . *Acanthaclisini*.
Claws scarcely curved, rarely longer than the basal joint; hair on thorax and legs short, that on legs much shorter than the black bristles; the sense-hair at base of femur beneath (when present) never as long as the femur; body rather slender; basal tarsal joint much longer than broad.

Myrmeleonini.

MYRMELEONINI.

Of this the typical group only, the typical genus, *Myrmeleon*, occurs in the Nearctic fauna.

MYRMELEON Linné.

Syst. nat., 1767, ed. 12, 1, pt. 2, p. 913.

Second anal vein of fore-wing as given for subfamily; in hind-wing at least four or five cross-veins before radial sector; antennae widely separated at base; radial sector in both pairs beyond cubital fork, but sometimes not so much so in fore-wings; a single series of costal cells; Banksian line indistinct or absent; intercubital line usually distinct; apical field with some cross-veins; in fore-wing the cubitus shows at base a branch which runs parallel to the first anal for a short distance, and is connected to cubitus by one cross-vein. In hind-wing the third anal at base runs close to the second and typically (*formicarius* and *immaculatus*) is forked, but in most Nearctic species it is simple. Legs short; fifth tarsal joint plainly longer than first; the spurs about equal to the first joint.

The abdomen of male is not longer than in female; in both sexes the last segment is very short, and in the male the next to last segment is shorter than in the female.

TYPE.—*M. formicarius* Linné. Europe.

There are six good and one doubtful Nearctic species.

1. Cross-veins between radius and radial sector reduced in number so that some of these cells are very much longer than the normal cells behind them; first anal vein ends nearly as far out as origin of radial sector,

- three connections between this anal and the cubital fork; second anal usually connected to first branch of first anal; third anal vein of hind-wings forked; large species. *immaculatus*.
 Cross-veins between radius and radial sector normal, the cells about same size as other cells near by; third anal of hind-wings simple. 2
2. Wings with veins unmarked; a yellow stripe through bases of wings; pronotum with a broad median dark stripe, sides broadly pale; legs reddish, mostly unmarked; upper half of clypeus black. *texanus*.
 Wings more or less dotted or spotted on the veins; pronotum more dark than pale. 3
3. Radial sector almost as far basad as the cubital fork; three or four connections between anal and cubital fork; no black on the clypeus; lateral margin of pronotum at least partly dark; tarsi partly pale; a pale spot on each lateral lobe of the metanotum. *mobilis*.
 Radial sector much beyond cubital fork; usually black marks on the clypeus. 4
4. A fairly broad stripe of clear yellow along outer margin of pronotum back through bases of the wings, so that the upper edges of pleura are yellow; tarsi almost wholly black; three or four connections from anal to cubital fork. *heriocles*.
 No such yellow stripe; the posterior corners of pronotum dark or at least dark in front of base of fore-wings; usually but two cross-veins between anal and cubital fork. 5
5. No dark on clypeus; posterior part of mesonotum pale. *diversus*.
 Clypeus with dark; mesonotum all dark. 6
6. Vertex all dark; tarsi mostly dark; usually two rows of gradates in the apical area; last joint of labial palpi not greatly swollen, and with rather long point. *crudelis*.
 Vertex spotted with pale; tarsi marked with pale; usually but one row of gradates in the apical area; last joint of labial palpi greatly swollen and with short point. *rusticus*.

A natural grouping of the Nearctic species would be as follows: —

- a. Pronotum about twice as broad as long; usually three or four connections between first anal vein and cubital fork, large species.
 b. Some hair on pronotum black. *immaculatus* and *mobilis*.
 bb. All hair on pronotum white; more than four cross-veins before radial sector in hind-wing. *heriocles*.
- aa. Pronotum but little broader than long in the middle; smaller species; usually but two connections between first anal vein and cubital fork.
 c. Vertex wholly dark. *crudelis* and *texanus*.
 cc. Vertex maculate. *rusticus* and *diversus*.

MYRMELEON IMMACULATUS DeGeer.

Plate 2, fig. 36.

Myrmeleon immaculatus DeGeer, Mem., 1773, 3, p. 364, pl. 27, fig. 8.

Face shining dark brown or blackish, sides near eyes and the clypeus pale yellowish, above the antennae dull blackish; vertex dark, with the transverse spots shining; pronotum dull black, the lateral anterior corners pale, two pale spots in front-part, and behind two farther apart and more indistinct; rest of the notum black, the margins narrowly pale; the pleura black; legs pale, femora and tibiae more or less dotted, and dark at tips, the tibiae also dark near base, and on under side, tarsi mostly dark, but pale on bases of first and fifth joints, bristles black. Abdomen dark, sometimes pale spots at bases of segments above, hair mostly white, but in the female the last segment and tips of others above with short black hair.

Wings unmarked, stigma pale, venation with many dark spots and streaks.

Last joint of labial palpi moderately enlarged; a shallow, rounded impression in middle of face below antennae; pronotum twice as broad as long. In the fore-wing the cross-veins between radius and radial sector are reduced in number so that some of these cells are elongated; in middle of wing is a faint beginning of the Banksian line; the intercubital line (in middle part) as near (or almost so) to hind margin as to the cubitus; the radial sector much beyond cubital fork, about opposite the end of the first anal vein, about eight cross-veins before it; the second anal is connected to the first branch of the first anal vein; three or four connections between first anal and cubital fork; scattered cross-veins in apical field. In hind-wing the intercubital much nearer cubitus than to margin; the anal tends to run into the cubital fork; the third anal vein is forked.

In the variety *occidentalis*, there are dark marks between subcosta and radius, and these may be extended back over some of the radial cross-veins. However not all western specimens are thus marked, and sometimes eastern specimens are marked.

Length fore-wing 22 to 36 mm., width 5.8 to 8 mm.

Length hind-wing 20 to 34 mm., width 5 to 6.8 mm.

Length abdomen 18 to 22 mm.

Occurs practically all over the United States reaching into Canada in various places; more common in Southwest than elsewhere. Specimens examined are from the following states:—N. H., N. Y., Md.,

Mich., Va., N. C., Colo., N. M., Ariz., Utah, Nev., Wash., Ore. and Calif. Also from B. Col., and have seen specimens from Pa., Wyo., N. J., Okla., Ohio, and Fla.

Recorded by Currie from Illinois and Louisiana.

MYRMELEON MOBILIS Hagen.

Can. ent., 1888, 20, p. 204.

Marks of face and vertex very much as in *immaculatus*, the clypeus unmarked, pronotum with more pale, the pale spots larger and more or less connected, metanotum with two pale spots above, pleura somewhat spotted with pale, legs less dotted than in *immaculatus*, femora with apical marks, tibia with subbasal and apical spots, and the tarsi more pale, bristles black. Abdomen brown, with white hair, under-side of last segments of female with short black hair, at least in apical part. Wings unmarked, stigma pale, veins marked as in *immaculatus*; the cells between radius and radial sector numerous and fairly short; intercubital line distinct, much nearer to cubitus than to margin. Radial sector farther basad than in *immaculatus*, only a little beyond the cubital fork, about seven cross-veins before it; second anal usually connected to first branch of the first anal; three or four connections between first anal and the cubital fork; about eleven branches to radial sector; scattered cross-veins in apical field. In hind-wing the intercubital line is distinct, with only one row of cells between it and the cubitus; third anal vein not forked. Face, pronotum, and legs as in *immaculatus*. The measurements are similar to those of *M. immaculatus*.

The type is from Savannah, Ga. (Winthem coll.).

Hagen received several specimens from Alabama, and I have one from Bainbridge, Ga., September.

Though generally confused with *immaculatus*, the numerous cross-veins between radius and radial sector, and the simple third anal vein in hind-wings, as well as color-marks, will separate it.

MYRMELEON HERIOCLES Banks.

Proc. Acad. nat. sci. Phil., 1914, p. 619.

Face rich dark brown; clypeus pale, with two dark spots, last joint of labial palpi black, above antennae and the vertex dark brown, but vertex usually a little paler than face; basal joints of antennae more or less pale, rest black; pronotum dark, lateral margins pale, three spots

in front, the lateral ones connected to pale margin, and two less distinct behind; rest of notum and the pleura dark, the yellow of the sides of pronotum is continued back through the bases of the wing, so that the upper edge of pleura is yellow and also the connecting parts at base of the wings; hair on thorax white. Femora more or less infusate in the middle, pale at ends, under-side and tips of tibiae dark, and tarsi almost wholly black, bristles black. Abdomen dull blackish, with white hair, in the female the last two segments with short black hair. Wings unmarked, stigma pale; venation dotted with dark, with longer spots on main veins. No broad impression on face; pronotum about twice as broad as long. Wings with radial sector much beyond the cubital fork, about ten cross-veins before it, in hind-wings from five to eight veins before radial sector; the intercubital line distinct, much nearer to cubitus than margin; three or four connections between the first anal and the cubital fork; second anal often connected to the first branch of the first anal; about eleven branches of the radial sector, scattered cross-veins in apical field; in hind-wing the third anal is not forked.

Length fore-wing 31 to 36 mm., width 7.3 to 8.6 mm.

Length hind-wing 29 to 34 mm., width 6 to 7 mm.

Length abdomen 22 to 23 mm.

Specimens examined.—N. C.: Southern Pines, May (Type). Fla.: Crescent City. N. J.: Lakhurst (Brooklyn mus.).

MYRMELEON TEXANUS Banks.

Plate 4, fig. 81.

Myrmeleon texanum Banks, Ent. news, 1900, **11**, p. 596.

Face reddish brown, extending down on upper part of clypeus, rest of clypeus and sides of face near eyes pale yellow, above antennae dull reddish, vertex more shining reddish; last joint of labial palpi pale. Pronotum pale yellow, with a median brown stripe, about twice as broad behind as in front; rest of notum and the pleura a dull reddish brown; base of wings yellowish; all hair on thorax white. Legs reddish; the tibiae more yellow on upper sides; bristles black; abdomen dull brown, with white hair, in the female the last segments with short black hair.

Venation of wings pale yellowish, unmarked. Last joint of labial palpi but little swollen; pronotum but little broader than long in the middle. In both wings the radial sector is beyond the end of anal, in

fore-wings about ten, and in hind-wings four cross-veins before radial sector; about twelve branches to radial sector; intercubital line distinct, two or three cells from the cubitus; in hind-wing the intercubital line less distinct, irregular; in fore-wing two or three connections from first anal to cubital fork; second anal not connected to first branch of first anal; scattered cross-veins in apical field; in hind-wings the third anal not forked. In all of the few specimens seen the fork of the median in the fore-wings ends before the cubital fork (rarely so in any other species).

Length fore-wing 27 mm., width 7 mm.

Length hind-wing 25 mm., width 5.3 mm.

Length abdomen 20 mm.

Specimens examined.—Tex.: Galveston, June (TYPE); Austin.

MYRMELEON CRUDELIS Walker.

Plate 2, fig. 37.

Myrmeleon crudelis Walker, Cat. Neur. Brit. mus., 1853, pt. 2, p. 388.

Face shining brown or blackish; clypeus with two dark spots; vertex more or less reddish brown. Pronotum narrowly pale on the sides, and more or less in front and each side near middle, but quite variable, always dark in middle and a dark stripe each side to the furrow, but these not sharply defined and sometimes confluent into one large dark middle area; clothed with white hair; rest of notum dark, scutelli narrowly bordered behind with pale; pleura dark, with two or three small pale spots. Femora broadly dark toward tip, tibiae near base, beneath, and at tip, tarsi almost wholly dark, bristles black. Abdomen dull brown, tips of several segments above pale, hair white, in female last ventral with black hair. Venation pale, mostly dotted, but some of the principal veins with larger spots or streaks. Last joint of labial palpi moderately swollen; pronotum as long in middle as broad. In fore-wings about seven cross-veins before radial sector, four in hind-wings; ten to eleven branches of the radial sector; in fore-wings first anal is connected to cubital fork two (sometimes three) times; second anal rarely connected to first branch of first anal; scattered cross-veins in apical field, intercubital line much nearer to cubitus than to margin; in hind-wings the third anal vein is not forked; the intercubital line not distinct, broken by cells; in both wings the radial sector is much beyond the cubital fork.

Length fore-wing 22 to 29 mm., width 4.9 to 7 mm.

Length hind-wing 20 to 27 mm., width 4.2 to 5.8 mm.

Length abdomen 16 to 20 mm.

Specimens examined.—Va.: Cape Henry, July; Virginia Beach. N. C.: Southern Pines, May. Ga.: Millen, July. Fla.: St. Augustine; Biscayne Bay; Crescent City; Capron; Enterprise; and Lee Co. Tex.: Brazos Co.; Laredo; San Antonio; Brownsville. Also Lakehurst, New Jersey (Davis coll.), Beaufort, Raleigh, North Carolina (N. Car. state coll.), Sandy Hook, New York, Florida (Amer. mus. nat. hist.); St. Simon's Island, Georgia (Cornell univ.), Brownsville, Texas (Brooklyn mus., Snow coll.), Riverton, New Jersey (Johnson).

MYRMELEON RUSTICUS Hagen.

Synop., 1861, p. 233.

Face shining dark brown or black, the clypeus with two large dark spots; vertex reddish brown or black on the vertex rows; between with yellow spots, thus a yellow spot each side by eye, which normally is connected to a yellow spot between the inner and outer dark spots of first vertex row (but absent in the TYPE); two gray spots behind near middle, and a yellowish spot each side on the occiput. Pronotum with the lateral margin pale, a median spot in front, one each side, and a pair behind, sometimes these spots are connected; rest of notum dark, usually a pale median spot on the base of metanotum; pleura dark, with a few pale spots; hair of thorax white. Femora usually dark only near the tip, tibiae near base and at tip, often (especially in hind-tibia) with a streak below; tarsi mostly pale; bristles black. Abdomen brown or black, tips of some of the segments usually pale above; hair white, in the female that on the last ventral black. Wings with pale venation, dotted with dark, spotted on the larger veins, in more fully colored specimens than the TYPE some of the cross-veins are largely or wholly dark. Structure similar to *M. crudelis*, but the last joint of the labial palpi is more enlarged; the pronotum is broader, being plainly broader than long in the middle. Wings also similar to *M. crudelis*, but in the apical field there is a single series of gradate cross-veins.

Length fore-wing 25 to 29 mm., width 6 to 7.4 mm.

Length hind-wing 23 to 27 mm., width 5.2 to 6.2 mm.

Length abdomen 18 to 19 mm.

Specimens examined.—Tex.: Pecos River (TYPE). N. M.: Mesilla, June. Ariz.: Nogales, June; Phoenix, September. Utah: St. George,

June; Lion's Canyon, June; Coal Creek, Iron Co., June. Calif.: Claremont; Coronado Beach.

The type of *rusticus* is rather larger and not as fully colored as the forms I described as *distans* and *agriope*. The red-brown of *rusticus* is black in the latter forms. However I consider them all one species.

MYRMELEON DIVERSUS Hagen.

6th rept. U. S. G. S. territ., 1873, p. 729.

The single type from the Yellowstone agrees in general with *M. rusticus*, but is rather smaller, with the wings faintly marked. The vertex spots are the same as in *rusticus*, but the large spot on face does not reach the clypeus, and there is no dark on clypeus. The pronotum is almost wholly pale, with a dark stripe on each side; the posterior part of the mesonotum is pale, and there are pale spots on the sides of the anterior lobe, and the metascutellum is also partly pale. The last joint of the labial palpi is as in *M. rusticus*. Probably it is but an aberrant specimen of that species.

Length fore-wing 24 mm., width 6 mm.

The length hind-wing 22 mm., width 5.2 mm.

Length abdomen 18 mm.

ACANTHACLISINI.

Three genera are separated as follows:—

1. Fore-wings with but one series of costal cells; apical field scarcely widened beyond the stigma; last joint of labial palpi scarcely pedicellate; the spurs bent at an angle (Plate 2, fig. 46).....*Paranthaclisis*.
Fore-wings with two series of costal cells for most of the length; apical field plainly widened beyond stigma; last joint of labial palpi long pedicellate; spurs simply curved, not bent at angle (Plate 2, fig. 47).....2
2. Hind-wings with a distinct Banksian line.....*Heoclisis*.
Hind-wings without a Banksian line.....*Vella*.

PARANTHACLISIS Banks.

Ent. news., 1907, 18, p. 275.

Antennae fully diameter of basal joint apart; spurs strongly bent at an angle, and before the angle swollen on inner side, equal to three tarsal joints; last joint of labial palpi not pedicellate; pronotum much broader than long, and much broader behind than in front; abdomen

much shorter than wings; wings fairly broad, costal area simple, and beyond the stigma the area is but little widened, Banksian and intercubital lines fairly distinct in both pairs; cross-veins before radial sector rarely crossed; in fore-wings the third anal is usually forked, the second usually not forked but connected to first branch of the first anal.

TYPE.— *P. congener* (Hagen).

Two species are readily separated as follows:—

1. Many cross-veins slightly margined with dark, so the wings appear spotted; vertex spots dull black; several abdominal segments marked with pale at tip; male appendages rather longer than height of last segment..... *congener*.
Cross-veins not margined; spots of vertex shining black; abdominal segments at most faintly pale margined; male appendages rather shorter than the height of last segment..... *hageni*.

PARANTHACLISIS CONGENER (Hagen).

Acanthaclisis congener Hagen, Synop., 1861, p. 224.

Face yellowish; palpi pale; lower part of antennae pale, then annulate, and tip dark; vertex with large spot each side and median stripe dull black; pronotum dull black, four pale spots in front, the laterals more or less continued behind, two broad pale spots on the posterior border, and usually a minute pale dot in the middle of the black; rest of notum black, much spotted with pale, anterior lobe pale each side, mesoscutellum with pale spot each side behind; pleura mostly dark, a few pale spots; femora and much of tibiae dark above, latter usually pale at base and tip, tarsi mostly dark, except last joint, sometimes legs largely or wholly pale; hair on pleura and legs almost wholly white, some bristles on legs black; the metanotum has hair all white, but meso- and pronotum with much black hair through middle, white on sides. Abdomen dull black, two or three segments near tip with pale spot above; hair short, white, but in female the last few segments with much black hair.

The longitudinal veins of the wings with dark streaks, many cross-veins wholly dark and more or less margined with brown, so that the whole wing appears rather evenly spotted; hind-wings mostly unmarked, the veins being partly dark. About seven cross-veins before radial sector in the fore-wing, about six in hind-wing; nine branches to radial sector; usually a few cubitals connected; apical field with one row of cross-veins. Male appendages fully as long as height of the last segment; in the female the lower appendages are pale.

Length fore-wing 32 to 37 mm., width 9 to 11 mm.

Length hind-wing 30 to 35 mm., width 7.5 to 9 mm.

Length abdomen 25 to 27 mm.

Specimens examined.—Calif.: San Bernardino, July. Ariz.: Jerome, June; Verde River. Utah: Hurricane; Ore. Wash.: Ainsworth, July; Yakima River, July. Also Arizona (Amer. mus. nat. hist.), Nogales, Arizona (Cornell univ.), Las Cruces, New Mexico (N. M. agric. coll.).

PARANTHACLISIS HAGENI (Banks).

Acanthaclisis hageni Banks, Ent. news, 1899, 10, p. 170.

Face and palpi yellowish; antennae rather faintly annulate, tip dark; vertex with the spots deep shining black, with white hair between them; pronotum black, with four pale spots in front, the inner pair more separated than in *congener*, each side behind with a large pale spot, and two on the posterior border; rest of notum spotted much as in *congener*; pleura dark, scarcely spotted; femora mostly brownish, often darker above, tibiae also brownish, more evenly colored than in *congener*, tarsi black, hair on pleura and legs white, that on hind-legs less prominent, and with many black bristles; notum with white hair on the metanotum, that on middle area of pro- and mesonotum with much black hair mixed with the white. Abdomen black, unmarked, with very short white hair, in the female the last segments with mostly black hair. Venation of wings interruptedly black and whitish, many cross-veins wholly black, but not margined; about eight cross-veins before radial sector in the fore-wings, in hind-wings about six, about ten branches to the radial sector, usually two or three cubitals connected, one row of cross-veins in apical field. Male appendages parallel, shorter than height of the last segment; in female the lower appendages are black.

Length fore-wing 35 to 37 mm., width 9 to 10 mm.

Length hind-wing 32 to 35 mm., width 8 to 8.5 mm.

Length abdomen 22 to 24 mm.

Specimens examined.—Ariz.: Phoenix (TYPE); Safford. N. M.: Albuquerque, August. Tex.: Pecos, July. Also Kansas (Snow coll.), Santa Fe and Albuquerque, New Mexico (Cornell univ.), Mesilla, New Mexico (N. Mex. agric. coll.), Brownsville, Texas (Brooklyn mus.).

HEOCLISIS Navas.

Mem. Pont. acad. Rom. nuovi Lincei, 1923, ser. 2, 6, p. 12.

Antennae almost diameter of basal joint apart; last joint of labial palpi long pedicellate; spurs curved, about equal to three tarsal joints; pronotum about as long in middle as broad in front, but broader

behind; abdomen in both sexes much shorter than wings. Fore-wings with double costal series to near base, at least to origin of radial sector; beyond the stigma the area is much widened; the Banksian and intercubital lines distinct in both pairs; second anal vein not forked, but connected to first branch of the first anal vein, third anal forked. Usually some cubitals and some cross-veins before the radial sector in fore-wings are crossed.

TYPE.—*H. fundata* (Walker). Australia.

Acanthaclisis americana cannot remain in the typical genus if the group is divided into several genera, as is now generally accepted; it agrees well in with *Heoclis* which occurs in Asia and Australia.

HEOCLISIS AMERICANA (Drury).

Plate 2, fig. 47.

Myrmeleon americanum Drury, Ins., 1770, 1, p. 111, pl. 46, fig. 4.

Face yellowish; last joint of labial palpi mostly black; antennae scarcely annulate; front and vertex black, latter partly shining, a pair of faint pale submedian lines behind; pronotum gray, a basal median black stripe, and the lateral margins black; rest of notum black, with some gray areas, especially each side of mesoscutellum; pleura mostly gray, with black, and pale spots; femora brownish, tibia also, but banded with pale, tarsi black; long hair on legs, pleura, and metanotum white, on pronotum and mesonotum with black hair medially. Abdomen black, unmarked, white hair near base, black toward tip. Venation black and pale in patches, the radius and subcosta with many dark spots, and the space between largely black, space between medius and cubitus also mostly dark, beyond the rhagma two dark spots and a streak in the apex of wing, another about middle near hind-margin, and a spot at end of anal vein; some of the marginal forks are clouded; the cross-vein often wholly dark, but not margined; hind-wings with spot at rhagma, and the veins partly black.

Last joint of labial palpi long, pedicellate; antennae shorter than head and thorax, not very strongly clavate; abdomen much shorter than wings, male appendages longer than height of last segment, subparallel.

Fore-wings with double costal series to origin of radial sector; apical field with one row of cross-veins, about eleven cross-veins before radial sector in fore-wings, seven in hind-wings, ten branches to radial sector, usually some cubitals crossed, along the Banksian line are some hyaline dots on the cross-veins.

Length fore-wing 52 to 60 mm., width 13 to 16 mm.

Length hind-wing 49 to 57 mm., width 11 to 13.5 mm.

Length abdomen 32 mm.

Specimens examined.—N. C.: Newbern; Beaufort, September; Southern Pines, July, August. Ga.: Millen. Also Virginia, Norfolk (Chittenden). Florida (Acad. nat. sci. Phil.).

VELLA Navas.

Broteria, 1913, **11**, p. 46.

Antennae diameter of basal joint apart; last joint of labial palpi long pedicellate; spurs curved, about equal to three tarsal joints; pronotum broader than long, narrowed in front; abdomen of both sexes much shorter than the wings. Fore-wings with a double series of costal cells for usually more than one half-way to base; apical field much broadened beyond stigma; the Banksian and intercubital lines distinct in fore-wings, in hind-wings no sign of the Banksian line, the intercubital distinct; in fore-wings the second anal vein usually not forked, the third forked, the second connected to first branch of first anal. Usually some cubitals and some cross-veins before radial sector crossed.

TYPE.—*V. fallax* (Rambur).

Our three forms are closely related and may prove with more material to be but one variable species; they are separated as below:—

1. Pronotum with a median dark stripe, and the lateral margin dark, pale between; the abdomen mostly pale.....2
 Pronotum with median and marginal stripes and also one each side between them; abdomen mostly dark; space between the radius and subcosta mostly dark.....*hesperus*.
2. The mesoscutellum largely dark; venation very dense; space between subcosta and radius little if any marked; male appendages shorter...*fallax*.
 The mesoscutellum pale with middle stripe; venation more open; space between the subcosta and radius heavily marked; male appendages longer.....*texana*.

Of *V. texana* I have seen only the types, of *hesperus* only the three original specimens, and of *fallax* several from Mexico, but only one specimen from the United States. *V. texana* is the most heavily spotted, while *hesperus* has more evenly dark front-wings, *fallax* more faintly and irregularly marked. In *texana* and *hesperus* the space between the subcosta and radius is mostly dark, in *fallax* pale, rarely a few faint marks. In *texana* and *fallax* the pronotum has a dark median stripe

containing a pale line in front, and the side-margins dark; in *hesperus* there is besides a dark stripe on each side between the two. The abdomen of *hesperus* is mostly black, with narrow pale stripes; in *fallax* and *texana* it is mostly pale, with narrow dark stripes. The male appendages of *texana* and *hesperus* are a little longer than in *fallax*, *V. fallax* is more densely veined than the others.

In all the face is yellowish, the palpi pale, the last joint of labial palpi scarcely darkened, the vertex dull black, the notum of thorax black, with gray streaks and spots, the femora darkened above, the tibiae dark near base and at tip.

The fore-wings have a double series of costal cells rather more than one half-way to base, there are usually more than ten cross-veins before the radial sector, often several crossed, about nine branches to radial sector, the apical field with two rows of cross-veins; some of the cubitals connected; the subcosta and radius closely dotted with black; in hind-wings seven cross-veins before radial sector.

VELLA TEXANA (Hagen).

Acanthaclisis texana Hagen, Can. ent., 1887, 19, p. 147.

Length fore-wing 55 mm., width 14 mm.

Length hind-wing 53 mm., width 10 mm.

Length abdomen 34 mm.

The type and others examined are from Carrizo Springs, Texas.

VELLA FALLAX (Rambur).

Myrmeleon fallax Rambur, Hist. ins. Névr., 1842, p. 385.

The only specimen from the United States is from Phoenix, Arizona, it is smaller than Mexican specimens.

Length fore-wing 48 mm., width 11 mm.

Length hind-wing 45 mm., width 8 mm.

Length abdomen 30 mm.

VELLA HESPERUS (Banks).

Acanthaclisis hespera Banks, Proc. Acad. nat. sci. Phil., 1914, p. 618.

Measurements about as in *texanus*.

The types are from Jemez Mts., N. Mex. Another from Nogales, Arizona, July (Cornell univ.).

EXPLANATION OF PLATES.

PLATE 1.

PLATE 1.

- Fig. 1. *Hesperoleon papago*, vertex and pronotum.
- Fig. 2. *Hesperoleon coquilletti*, vertex and pronotum.
- Fig. 3. *Hesperoleon yavapai*, vertex and pronotum.
- Fig. 4. *Hesperoleon irregularis*, vertex and pronotum.
- Fig. 5. *Hesperoleon abdominalis*, vertex and pronotum.
- Fig. 6. *Hesperoleon niger*, vertex and pronotum.
- Fig. 7. *Hesperoleon minuseulus*, vertex and pronotum.
- Fig. 8. *Hesperoleon maculosus*, vertex and pronotum.
- Fig. 9. *Hesperoleon nigrilabris*, vertex and pronotum.
- Fig. 10. *Hesperoleon tenuis*, vertex and pronotum.
- Fig. 11. *Hesperoleon texanus*, vertex and pronotum.
- Fig. 12. *Hesperoleon sackeni*, vertex and pronotum.
- Fig. 13. *Hesperoleon hubbardi*, vertex and pronotum.
- Fig. 14. *Hesperoleon brunneus*, vertex and pronotum variations.
- Fig. 15. *Brachynemurus elongatus*, pronotum.
- Fig. 16. *Hesperoleon douglasi*, pronotum.
- Fig. 17. *Hesperoleon ferox*, pronotum.
- Fig. 18. *Hesperoleon abdominalis*, pronotum.
- Fig. 19. *Hesperoleon assimilis*, pronotum.
- Fig. 20. *Hesperoleon carrizonus*, pronotum.
- Fig. 21. *Netroneurus carolinus*, pronotum.
- Fig. 22. *Austroleon dorsalis*, vertex and pronotum.
- Fig. 23. *Hesperoleon versutus*, vertex and pronotum.

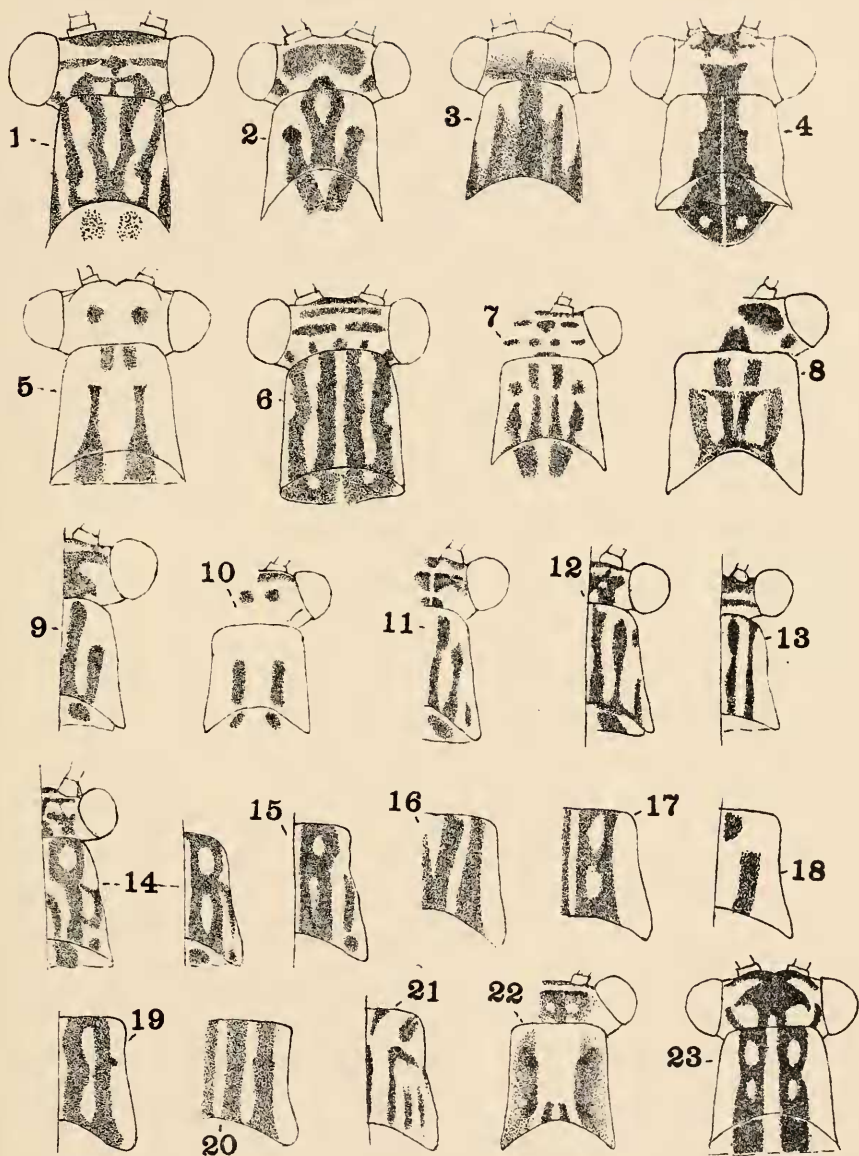


PLATE 2.

PLATE 2.

- Fig. 24. *Austroleon barberi*, vertex and pronotum.
- Fig. 25. *Netroneurus pulchellus*, vertex and pronotum.
- Fig. 26. *Eremoleon nigribasis*, vertex and pronotum.
- Fig. 27. *Chaetoleon pusillus*, vertex and pronotum.
- Fig. 28. *Brachynemurus longicaudus*, vertex and pronotum.
- Fig. 29. *Cryptoleon henshawi*, vertex and pronotum.
- Fig. 30. *Clathroneuria delicatulus*, vertex and pronotum.
- Fig. 31. *Eremoleon macer*, vertex and pronotum.
- Fig. 32. *Psammoleon minor*, male appendages.
- Fig. 33. *Psammoleon bistictus*, male appendages.
- Fig. 34. *Psammoleon sinuatus*, male appendages.
- Fig. 35. *Psammoleon connexus*, male appendages.
- Fig. 36. *Myrmeleon immaculatus*, anal area of hind-wings.
- Fig. 37. *Myrmeleon crudelis*, anal area of hind-wings.
- Fig. 38. *Psammoleon guttipes*, male appendages.
- Fig. 39. *Eremoleon macer*, anal area of fore-wing.
- Fig. 40. *Chaetoleon pumilis*, anal area of fore-wing.
- Fig. 41. *Dendroleon speciosum*, anal area of fore-wing.
- Fig. 42. *Psammoleon minor*, spurs.
- Fig. 43. *Psammoleon guttipes*, spurs.
- Fig. 44. *Psammoleon connexus*, spurs.
- Fig. 45. *Glenurus gratus*, anal area of fore-wing.
- Fig. 46. *Paranthaclisis*, spurs and labial palpus.
- Fig. 47. *Heoclisis americana*, spurs and labial palpus.

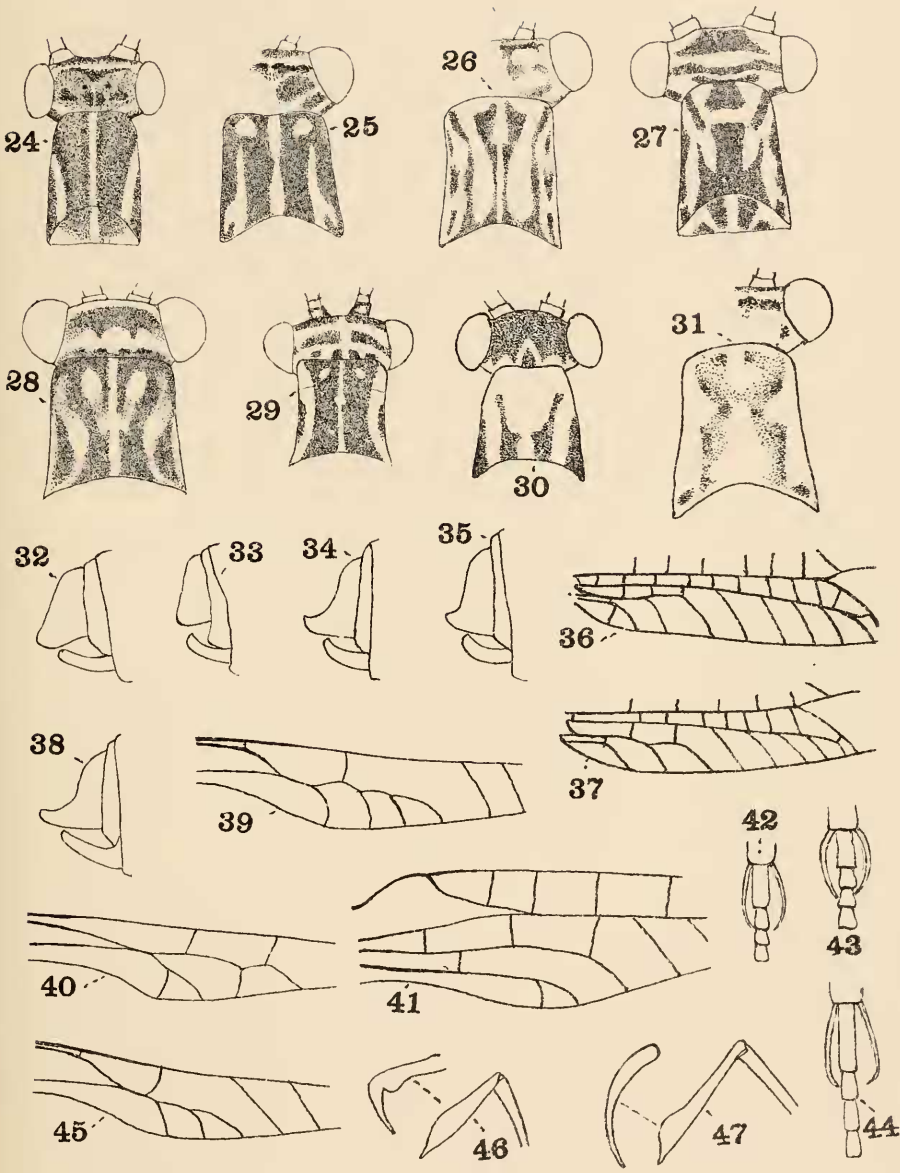


PLATE 3.

PLATE 3.

- Fig. 48. *Hesperoleon sackeni*, tip abdomen, male.
- Fig. 49. *Cryptoleon nebulosum*, tip abdomen, male.
- Fig. 50. *Cryptoleon signatum*, tip abdomen, male.
- Fig. 51. *Hesperoleon pallidus*, tip abdomen, male.
- Fig. 52. *Hesperoleon nigrilabris*, tip abdomen, male.
- Fig. 53. *Hesperoleon abdominalis*, tip abdomen, male.
- Fig. 54. *Hesperoleon minusculus*, tip abdomen, male.
- Fig. 55. *Cryptoleon henshawi*, tip abdomen, male.
- Fig. 56. *Cryptoleon nebulosum*, labial palpus.
- Fig. 57. *Brachynemurus elongatus*, tip abdomen, male.
- Fig. 58. *Brachynemurus ramburi*, tip abdomen, male.
- Fig. 59. *Hesperoleon niger*, labial palpus.
- Fig. 60. *Hesperoleon maculosus*, hind tarsus.
- Fig. 61. *Hesperoleon carrizonus*, tip abdomen, male.
- Fig. 62. *Hesperoleon singularis*, tip abdomen, male.
- Fig. 63. *Hesperoleon douglasi*, tip abdomen, male.
- Fig. 64. *Hesperoleon abdominalis*, tip abdomen, male.
- Fig. 65. *Hesperoleon assimilis*, tip abdomen, male.
- Fig. 66. *Hesperoleon pallidus*, front of head.
- Fig. 67. *Hesperoleon minusculus*, hind tarsus.
- Fig. 68. *Scotoleon longipalpis*, labial palpus.
- Fig. 69. *Brachynemurus tuberculatus*, tip abdomen, male.
- Fig. 70. *Brachynemurus longicaudus*, tip abdomen, male.
- Fig. 71. *Hesperoleon ferox*, tip abdomen, male.
- Fig. 72. *Brachynemurus tuberculatus*, front of head.
- Fig. 73. *Hesperoleon singularis*, front of head.
- Fig. 74. *Netroneurus carolinus*, front of head.

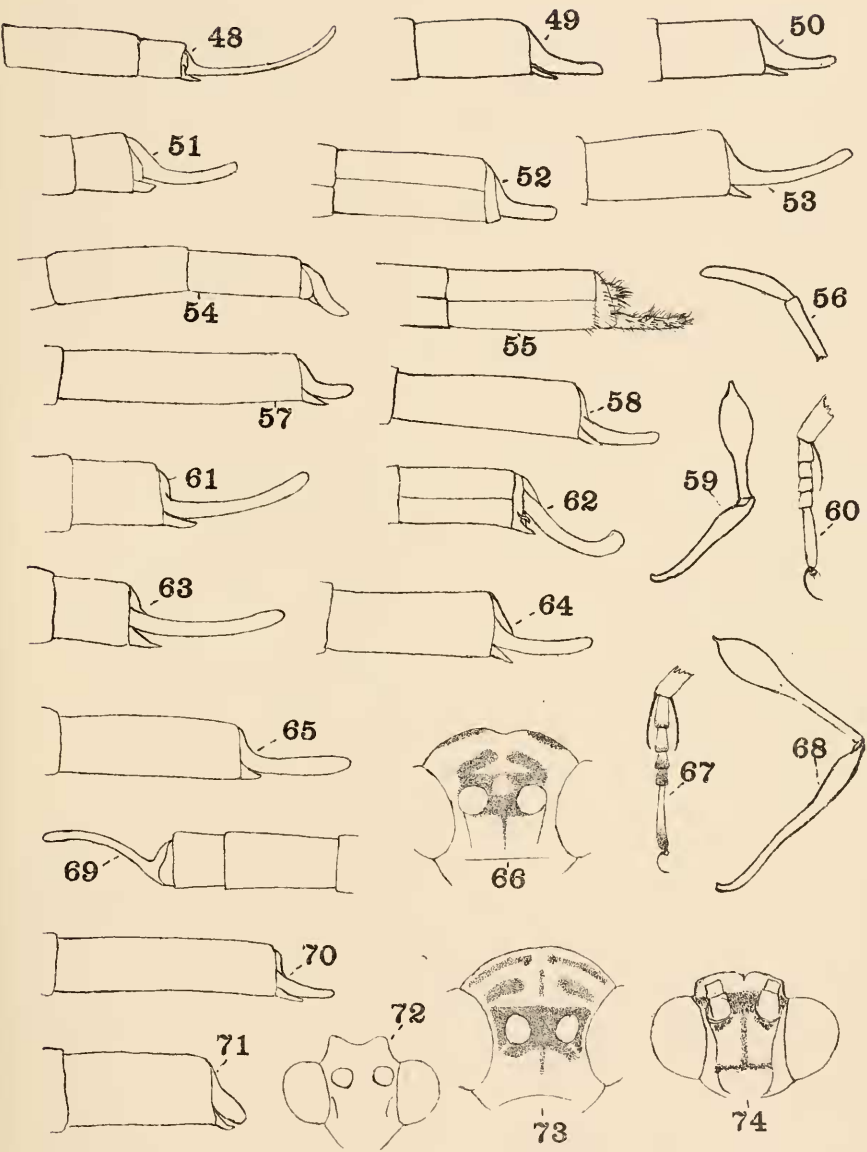


PLATE 4.

PLATE 4.

- Fig. 75. *Hesperoleon blandus*, pronotum.
- Fig. 76. *Hesperoleon intermedius*, pronotum.
- Fig. 77. *Hesperoleon quadripunctatus*, pronotum.
- Fig. 78. *Hesperoleon singularis*, pronotum.
- Fig. 79. *Clathroneuria schwarzi*, pronotum.
- Fig. 80. *Puren inscriptus*, pronotum.
- Fig. 81. *Myrmeleon texanus*, pronotum.
- Fig. 82. *Hesperoleon yavapai*, hind-wing, apical area.
- Fig. 83. *Austroleon dorsalis*, male abdomen, tip.
- Fig. 84. *Hesperoleon blandus*, male abdomen, tip.
- Fig. 85. *Hesperoleon versutus*, male abdomen, tip.
- Fig. 86. *Hesperoleon coquilletti*, front tarsus.
- Fig. 87. *Hesperoleon mexicanus*, male abdomen, tip.
- Fig. 88. *Hesperoleon intermedius*, male abdomen, tip.
- Fig. 89. *Hesperoleon coquilletti*, male abdomen, tip.
- Fig. 90. *Hesperoleon hubbardi*, male abdomen, tip.
- Fig. 91. *Hesperoleon yavapai*, male abdomen, tip.
- Fig. 92. *Scotoleon longipalpis*, male abdomen, tip.
- Fig. 93. *Puren inscriptus*, hind tarsus.
- Fig. 94. *Hesperoleon irregularis*, front tarsus.
- Fig. 95. *Hesperoleon hubbardi curtus*⁶, male abdomen, tip.
- Fig. 96. *Hesperoleon quadripunctatus*, male abdomen, tip.
- Fig. 97. *Hesperoleon brunneus*, male abdomen, tip.
- Fig. 98. *Hesperoleon texanus*, male abdomen, tip.
- Fig. 99. *Clathroneuria schwarzi*, male abdomen, tip.
- Fig. 100. *Calinemurus fuscus*, male abdomen, tip.
- Fig. 101. *Dendroleon obsoletum*, hind tibia and tarsus.

